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# 1AC

## 1AC --- Aquaculture

#### Contention \_\_: Aquaculture

#### Global fish shortage is inevitable---causes resources conflicts and death of a billion---OTEC is key to generate sustainable aquaculture which ensures food security.

Emma Websdale 14, an environmental journalist and senior communications specialist at Ocean Thermal Energy Corporation, “The Promise of OTEC Aquaculture,” 2-24-14, <http://empowertheocean.com/otec-aquaculture/> DOA: 6-24-14, y2k

In a time of declining wild fish stocks and growing fish demand – which currently over a billion people globally depend upon as their primary source of protein – aquaculture is becoming an important component in helping to improve food security in many parts of the world. ‘Aquaculture’ refers to the rearing, breeding and harvesting of aquatic animals and plants across a variety of water environments including ponds, rivers, lakes and oceans, primarily for human consumption. Aquaculture practices have also proved important for restoring threatened and endangered aquatic species and providing fish for aquariums. Need for Aquaculture Industry A recent collaborative report between the World Bank, Food and Agriculture Agency (FAO) and the International Food Policy Research Institute (IFPRI) has highlighted the urgent need to increase investment into sustainable aquaculture in order to meet growing fish demands. The report, entitled ‘Fish to 2030: Prospects for Fisheries and Aquaculture’, estimates that by 2030, 62% of all consumed seafood will need to be farmed, including fish for foods and fishmeal, in order to meet demand. Demand is greatest in certain regions, particularly Asia, where approximately 70% of fish will be consumed. The report states that aquaculture will help satisfy the world’s growing appetite for fish as human populations continue to grow. Investing in aquaculture is not a new notion. In 2007, the United Nations cautioned that without better management of fish production, the rising demand for seafood would lead to a collapse of today’s commercial fish stocks by 2050. aquaculture pensFurthermore, the UNEP Global Environment Outlook Year Book 2007 noted that the impact of climate change on the world’s oceans (by increasing ocean acidity and bleaching coral reefs) would further aggravate the fishing dilemma. These projections have since been strongly supported by scientists and organizations. A report released in October 2013 estimated that human-induced greenhouse gases are not only increasing the acidity of our water but are also depleting water oxygen levels -two biochemical changes that are likely to reduce ocean productivity significantly. Meeting the Rising Appetite for Fish Fortunately, some organizations and companies are developing sustainable methods and technologies for aquaculture. One recent advance that deserves attention is the water drawn by the pipes of Ocean Thermal Energy Conversion (OTEC) plants. OTEC is a base-load renewable energy production process particularly suited for tropical zones. By using the ocean’s abundant temperature differential between warm surface water and cold deep water, OTEC technology generates both clean energy and fresh drinking water. Due to the technology’s looped system, under certain conditions the water can be re-used for secondary applications including desalination to create fresh drinking water. One particularly attractive by-product of OTEC plants is nutrient-rich and virtually pathogen-free water from the deep ocean. This water provides an optimal environment for various forms of aquaculture cultivation of both plants and animals. Through open-ocean fish farming (where adequate flushing ensures dilution of waste products), aquaculture can produce sustainable food supplies. Thus, OTEC provides an attractive application to the aquaculture industry, especially in the face of current declines in commercial fishing stocks. The cold, deep seawater, available as a result of producing renewable energy through OTEC technology has numerous advantages for aquaculture systems: -Rich in dissolved nitrogen, carbon and phosphorus, OTEC’s deep-ocean water contains chemicals that are essential for fish and plant growth. -The consistent low temperature of OTEC water provides opportunities to culture valuable cold-water organisms both in native environments and in the tropics. -The virtually pathogen-free water pumped by OTEC allows disease-free cultivation of sensitive organisms. Aquaculture via deep seawater is not just a theory or hopeful expectation. The Natural Energy Laboratory of Hawaii Authority (NELHA) currently utilizes cold deep seawater for both mature and developing commercial aquaculture applications. NELHA already farms numerous seafood products including shrimp, lobster, oysters, abalone, tilapia, kampachi, flounder and salmon. Additionally, aquaculture at NELHA includes the growing of microalgae for pharmaceuticals or biofuels, thus providing an input for humanitarian and environmentally friendly industries. Investment Opportunity Aquaculture is both sustainable and achievable. With wild fish stocks disappearing at an all-time rate, aquaculture provides a solution for replenishing global fish populations and alleviating pressure on intensively over-fished wild stocks. Moreover, OTEC aquaculture can provide self-sustaining food resources for tropical island communities, helping them to compete with foreign fishing industries. OTEC aquaculture can also strengthen local economies of small island developing states (SIDS), by creating job opportunities for local island residents. As the global population edges towards nine billion by 2050, the opportunity for jobs in the aquaculture industry will continue to grow. This economic impact doesn’t stop with island communities. Aquaculture can also extend to ‘upstream’ industries including agriculture, hatcheries, feed manufacturers, equipment manufacturers, and veterinary services. ‘Downstream’ industries such as processors, wholesalers, retailers, transportation, and food services are also supported by the aquaculture industry. Because OTEC plants can incorporate aquaculture services into their design, they will help to meet future fish demands – improving both food security and protection of dwindling wild fish populations. An investment into OTEC facilities is a smart one – it helps reduce the risk of global conflict over depleting food resources and enhances the livelihoods of the millions of people who depend upon our oceans.

#### Collapse of fish supply causes SCS conflict

Howard S. Schiffman 13 is an international lawyer and consultant to NGOs and other international organizations in such areas as the law of the sea and marine conservation law and policy. He teaches Contemporary Environmental Debates, International Environmental Goverance and the Environmental Conservation Education internship course. Howard's research interests include various aspects of marine conservation, international environmental governance and dispute settlement. Dr. Schiffman has published two books on environmental conservation (Marine Conservation Agreements, Martinus Nijhoff-Brill (2008) and Green Issues and Debates: An A-to-Z Guide (ed.), Sage (2011)) as well as numerous scholarly articles. Howard is committed to environmental education as a tool to address serious environmental problems. He earned a B.A. from Boston University, a J.D. from Suffolk University Law School in Boston, a LL.M. (Master of Laws) in International and Comparative Law from George Washington University Law School and a Ph.D. from the Cardiff University Law School (Wales, UK). He is admitted to practice law in New York State. In 2010 Dr. Schiffman was a Senior Fulbright Scholar in New Zealand where he researched the development of the South Pacific Regional Fisheries Management Organization (SPRFMO) and served as a visiting professor at Waikato University Law School. Prior to coming to NYU Steinhardt, Dr. Schiffman was the founding academic director of the NYU graduate program in Global Affairs (SCPS). Howard has taught at Yeshiva University in New York City and was a staff attorney with the Criminal Defense Division of the Legal Aid Society of New York. “Out of the Frying Pan: Pacific Fisheries and a Fresh Take on Security in Asia,” 7-2-13, <http://cogitasia.com/out-of-the-frying-pan-pacific-fisheries-and-a-fresh-take-on-security-in-asia/> DOA: 6-24-14, y2k

The crisis in global and regional fisheries, and the overall stress on the oceans, needs to be viewed in the realm of security. Resource driven competition has put a new spotlight on the oceans as a source of security threats – including fisheries. Dwindling fish stocks and increasingly aggressive action to ensure access to bountiful fishing grounds serve to highlight growing concern about fisheries as an aspect of Asia-Pacific security. Although less glamorous than traditional security threats, fisheries concerns might lead to new security challenges, or aggravate old ones. Let’s start with an obvious reality: China has a huge population and huge populations need lots of protein. Naturally, fish is a traditional source. The oceans are under stress and the capacity of the oceans to give up sufficient protein, including through aquaculture production, should be a global concern. Therefore, it should be no surprise that Chinese fisheries are a key element of this discussion. According to the Food and Aquaculture Organization’s 2012 State of World Fisheries and Aquaculture Report, China, which recently improved the way it tracks such statistics, is both a big consumer, and also by far the largest exporter, of fish. In some cases, it is such a prominent player in worldwide fisheries that it is useful to report statistics comparing China with everyone else. China also employs almost 14 million people as fishers or fish farmers. Although there is evidence of rebuilding in certain species, most commercial fish stocks worldwide are either fully exploited or over-exploited. This is a danger sign when so many people are dependent upon fish both to earn their living and to eat. Growing Indo-Pacific populations coupled with declining fish stocks are a recipe for regional insecurity. Beyond the issue of food security consider classic geopolitics in East Asia. Both the Diaoyu/Senkaku island dispute, between China and Japan, and the Spratly Island dispute in the South China Sea are among the most visible maritime disputes in the world. Access to fishing grounds is a factor in both disputes but crucially, it can also be used as a pretext to justify types of military action in those disputes. To cite just one example, in April 2013 a flotilla of boats carrying Japanese nationalists approached the Diaoyu/Senkaku islands claiming they were there to survey fishing grounds. They were shadowed by Japanese Coast Guard vessels and Chinese surveillance ships were not far away. These encounters cannot be underestimated for their security implications. Aggressive law enforcement actions, even military action, are not unheard of in the history of fisheries. The Atlantic Ocean offers some examples. While most would say the Atlantic today is a source of fewer security threats than the Pacific, between the 1950s and 1970s the United Kingdom and Iceland had a series of confrontations in the North Atlantic in the so-called “Cod Wars.” In 1995, Canada arrested the Spanish fishing vessel Estai on the High Seas in the North Atlantic when it was fishing for Greenland Halibut stocks claimed and protected by Canada. This “Turbot War” led to a highly contentious dispute in international law. Furthermore, France has arrested vessels on several occasions that it accused of illegal fishing for Patagonia Toothfish in the South Atlantic. In the Pacific where there are more underlying geo-political tensions, fisheries conflicts can exacerbate them. One geopolitical flashpoint is Taiwan’s status in these disputes. The level of tension across the Taiwan Strait is always on the radar of regional security analysts. In that vein, Pacific fisheries are an area where regional powers have had to tread lightly as Taiwan becomes more of a player. In September 2012 Taiwan joined the South Pacific Regional Fisheries Management Organization (SPRFMO), an intergovernmental body in which China is also a member. Taiwan is a member of other similar bodies such as the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and the Western and Central Pacific Fisheries Commission (WCPFC) but it does so under familiar euphemisms, such as Chinese Taipei, so as not to antagonize China’s sensibilities about its status. In April 2013, Taiwan and Japan entered into an agreement to address competing fisheries claims in the contested Diaoyutai Islands. While laudable, this agreement did nothing to address the underlying sovereignty claim over the islands. In May 2013, Taiwan experienced tension with the Philippines when the Philippine Coast Guard shot a Taiwanese fisherman in disputed waters in the Luzon Strait. This all leads to the inevitable conclusion that fisheries are a growing factor in global security. In the Pacific with its complex web of inter-connected security concerns, the status of fish and fishers need to be respected. Effective conservation policy and global education on the value of healthy oceans, needs to be thought of as a security issue, not just a matter of environmental policy. Across Asia, with no shortage of existing tensions and security challenges, dwindling fish stocks are a complicating factor. Policy-makers at the regional and global levels need to acknowledge the security challenges posed by the worsening condition of our oceans and act accordingly. This should include a greater willingness to subject fisheries disputes to international dispute settlement. This can be achieved in the International Tribunal for the Law of the Sea (ITLOS) and the International Court of Justice (ICJ). Regional bodies, such as ASEAN, should pursue fisheries issues with increased vigor. Beyond the obvious concern for resource and food security, the potential to affect regional security in traditional ways justifies a rethinking of our oceans.

#### Draws in the US and goes nuclear

John Blaxland 13, Senior Fellow at the Strategic and Defence Studies Centre, the Australian National University, and Rikki Kersten, Professor of modern Japanese political history in the School of International, Political and Strategic Studies at the College of Asia and the Pacific, the Australian National University, 2/13/13, “Escalating territorial tension in East Asia echoes Europe’s descent into world war,” http://www.eastasiaforum.org/2013/02/13/escalating-territorial-tension-in-east-asia-echoes-europes-descent-into-world-war/

The recent activation of Chinese weapons radars aimed at Japanese military platforms around the Senkaku/Diaoyu Islands is the latest in a series of incidents in which China has asserted its power and authority at the expense of its neighbours. The radars cue supersonic missile systems and give those on the receiving end only a split second to respond. With Japanese law empowering local military commanders with increased discretion to respond (thanks to North Korea’s earlier provocations), such incidents could easily escalate. In an era of well-established UN-related adjudication bodies like the International Court of Justice (ICJ), how has it come to this? These incidents disconcertingly echo past events. In the early years of the 20th century, most pundits considered a major war between the great powers a remote possibility. Several incidents prior to 1914 were handled locally or successfully defused by diplomats from countries with alliances that appeared to guarantee the peace. After all, never before had the world been so interconnected — thanks to advanced communications technology and burgeoning trade. But alliance ties and perceived national interests meant that once a major war was triggered there was little hope of avoiding the conflict. Germany’s dissatisfaction with the constraints under which it operated arguably was a principal cause of war in 1914. Similarly, Japan’s dissatisfaction helped trigger massive conflict a generation later. A century on, many of the same observations can be made in East Asia. China’s rise is coupled with a disturbing surge in jingoism across East and Southeast Asia. China resents the territorial resolution of World War II, in which the United States handed responsibility for the Senkaku/Diaoyu islands to Japan while large chunks of the South China Sea were claimed and occupied by countries that emerged in Southeast Asia’s post-colonial order. Oil and gas reserves are attractive reasons for China to assert itself, but challenging the US place in East Asian waters is the main objective. China resents American ‘re-balancing ‘as an attempt at ‘containment’, even though US dependence on Chinese trade and finance makes that notion implausible. China is pushing the boundaries of the accepted post-Second World War order championed by the United States and embodied by the UN. China’s rapid rise and long-held grievances mean its powerbrokers are reluctant to use institutions like the ICJ. But China’s assertiveness is driving regional states closer into the arms of the United States. Intimidation and assertive maritime acts have been carried out, ostensibly by elements not linked to China’s armed forces. China’s white-painted Chinese Maritime Services and Fisheries Law Enforcement Command vessels operating in the South China Sea and around the Senkaku/Diaoyu islands have evoked strong reactions. But Japan’s recent allegation that China used active radars is a significant escalation. Assuming it happened, this latest move could trigger a stronger reaction from Japan. China looks increasingly as if it is not prepared to abide by UN-related conventions. International law has been established mostly by powers China sees as having exploited it during its ‘century of humiliation’. Yet arguably, it is in the defence of these international institutions that the peaceful rise of China is most likely to be assured. China’s refusal to submit to such mechanisms as the ICJ increases the prospect of conflict. For the moment, Japan’s conservative prime minister will need to exercise great skill and restraint in managing domestic fear and resentment over China’s assertiveness and the military’s hair-trigger defence powers. A near-term escalation cannot be ruled out. After all, Japan recognises that China is not yet ready to inflict a major military defeat on Japan without resorting to nuclear weapons and without triggering a damaging response from the United States. And Japan does not want to enter into such a conflict without strong US support, at least akin to the discreet support given to Britain in the Falklands War in 1982. Consequently, Japan may see an escalation sooner rather than later as being in its interests, particularly if China appears the aggressor. China’s domestic environment has nurtured jingoism. The Chinese state has built up the public’s appetite for vengeance against Japan by manipulating films and history textbooks. On the other hand, Chinese authorities recognise that the peaceful rise advocated by Deng Xiaoping is not yet complete (militarily at least). In the meantime it is prudent to exercise some restraint to avoid an overwhelming and catastrophic response. If the 1914–18 war taught us anything, it is that the outcome of wars is rarely as proponents conceived at the outset.

#### Food crisis triggers Russian instability

Victor Yasmann 8 is RFE/RL analyst, “Analysis: Global Food Crisis Catches Up With Russia,” May 16, 2008, <http://www.rferl.org/content/article/1117497.html>, Accessed Date: 3-15-13 y2k

And for good reason. Even as food prices rise dramatically around the world, the rate of increase in Russia has been roughly three times greater than that in the European Union. In April, the cost of basic foodstuffs rose in Russia by 6.4 percent, compared to 1.8 percent in Europe, according to official Russian figures. Depending on the region, prices of basic products such as bread, milk, and meat have risen between 7 and 22 percent so far this year, moving inflation to the top of the list of Russia's national concerns. An opinion survey in March found that 39 percent of Russians view rising food prices as the biggest national problem, while 38 percent named inflation generally, and 27 percent named low wages. Just 8 percent of respondents mentioned corruption. These findings are an early warning worth heeding in a country with a history of hunger-triggered political unrest, most notably the 1917 February Revolution that toppled Tsar Nicholas II. The Kremlin understands this and purchased a measure of political stability during the election cycle that began last December with three price freezes on basic consumer goods. Earlier this year, Putin asked Deputy Prime Minister and Finance Minister Aleksei Kudrin (who retained both posts after Putin moved to the premiership last week) to head a special commission on inflation and to report weekly on the status of prices across the country. As the last price freeze expired on April 30, the government was preparing a special "food-security" law that would indefinitely fix the prices of seven "socially important" commodities. Medvedev, who for the last three years has overseen an ambitious national project to revive the agricultural sector, has tried to contain the political damage that seems inevitable if prices surge following the expiry of the latest price freeze. He has said that a global food deficit is the main driver of Russia's food troubles, adding that if not for his efforts in recent years, the situation would be worse. "It is very regrettable when you work and work and then this rubbish comes from the world market because of the mistakes of our colleagues in other countries," Medvedev complained. "And as a result the entire planet is suffering." Leading Food Importer Although food prices are, indeed, rising globally, Russia's leaders have downplayed the fact that Russia is one of the world's leading importers of food. As such, it stands to suffer disproportionately from the food crisis. Among G8 countries, only Russia and Japan are net food importers. Russia imports about 46 percent of the food and agricultural raw materials it consumes each year. At a February 14 press conference, Putin revealed that some of Russia's largest cities import up to 85 percent of the food they consume. All in all, Russia imports 75 percent of the meat it consumes and half of the vegetable oil. Still worse, Russian dependence on imported food is on the rise. Food imports increased by a factor of three between 2000 and 2006, and the primary reason for this is the ongoing decline of the country's agricultural sector. To take just one example, meat and milk production has fallen by half since 1990, and Russia's total cattle herd has declined to the level of 1918. Despite all of Moscow's talk of its "sovereign democracy," the country has failed to boost its independence in this crucial arena. According to figures released by the World Bank and the UN last month, global price increases for food are likely to continue, and accelerate, for the next decade. Russia's dependence on imported food has important domestic and international implications. Not only is it possible that food-related social unrest could disturb Russia's fragile stability, but it is also likely that the costs of supporting this habit could derail the Kremlin's ambitious plans to reshape the national economy. The Kremlin will be forced to divert more and more of its petrodollar windfall from national-development projects to the purchase of food imports. In fact, this process has already begun, as the country is swept by a massive wave of consumerism. Despite the price increases, Russia's consumption of meat, for instance, has increased 5 percent in 2008 alone. To meet rising demand, Moscow reduced import duties. Naturally, this boosted imports, but that made domestic production less competitive and enraged Russian farmers. Haves And Have-Nots The food crisis is also exacerbating the gap between the haves and the have-nots. While the richest part of the population can afford to spend more on food and can even increase consumption, the poorest 20 percent -- those who already spend about 60 percent of their income on food -- find themselves sorely pressed. On April 30, Agriculture Minister Aleksei Gordeyev (who likewise retains his post under the new regime) proposed dealing with this situation by adopting a so-called food-security law that would regulate prices of some commodities and increase state subsidies to the agricultural sector several times over. It also includes a provision that would introduce food stamps for the poorest Russians. Gordeyev's proposal has met with skepticism by those who see it as a relic of the Soviet planned economy and note that a similar plan was proposed by the Communist Party in 1997. Such a plan would likely have inflationary consequences and would do little to resolve the food-production problem. Nevertheless, the Economic Development and Trade Ministry has compiled a list of the socially important food products that would be subject to price controls -- including bread, milk, vegetable oil, butter, eggs, salt, and tea. The good news for Russia is that the country has available land and water resources to boost agricultural production. The bad news, however, is that this cannot be done quickly enough to forestall the social, economic, and political impact of its food deficit. The country simply lacks the workforce, the infrastructure, and the financial mechanisms for rapid development in this sector. Russia's food problem also has an international dimension. In recent years, Moscow -- as a major exporter of energy to the European Union and the countries of the Commonwealth of Independent States -- has used its position of strength for political ends, arguing that it is the seller, not the buyer, who determines prices. Now Russia finds itself in the position of an importer of a vital resource that cannot be replenished domestically any time soon. Russia, for instance, imports 35 percent of its beef and 40 percent of its pork from the European Union. Because of the humanitarian nature of food supplies, it is unlikely the Western democracies would openly use their leverage to pressure Moscow except in a crisis situation. However, the Putin-Medvedev leadership is aware of Russia's vulnerability on this point. In practical terms, this realization will serve as a natural constraint on Moscow's assertiveness in both the near and far abroad.

#### That causes accidental nuclear break-out

Peter Vincent Pry 99 is Former US Intelligence Operative, War Scare: U.S.-Russia on the Nuclear Brink, netlibrary

Russian internal troubles—such as a leadership crisis, coup, or civil war—could aggravate Russia’s fears of foreign aggression and lead to a miscalculation of U.S. intentions and to nuclear overreaction. While this may sound like a complicated and improbable chain of events, Russia’s story in the 1990s is one long series of domestic crises that have all too often been the source of nuclear close calls. The war scares of August 1991 and October 1993 arose out of coup attempts. The civil war in Chechnya caused a leadership crisis in Moscow, which contributed to the nuclear false alarm during Norway’s launch of a meteorological rocket in January 1995. Nuclear war arising from Russian domestic crises is a threat the West did not face, or at least faced to a much lesser extent, during the Cold War. The Russian military’s continued fixation on surprise-attack scenarios into the 1990s, combined with Russia’s deepening internal problems, has created a situation in which the United States might find itself the victim of a preemptive strike for no other reason than a war scare born of Russian domestic troubles. At least in nuclear confrontations of the 1950s–1970s—during the Berlin crisis, Cuban missile crisis, and 1973 Middle East war—both sides knew they were on the nuclear brink. There was opportunity to avoid conflict through negotiation or deescalation. The nuclear war scares of the 1980s and 1990s have been one-sided Russian affairs, with the West ignorant that it was in grave peril.

#### Best statistical studies flip aff---food shortage triggers armed conflicts

Wischanath & Buhaug 14 Gerdis Wischnath, Freie Universität Berlin, Berlin Graduate School for Transnational Studies and Peace Research Institute Oslo, PRIO—AND—Halvard Buhaug, Norwegian University of Science and Technology, NTNU, “Rice and riots: On food production and conflict severity across India,” <http://www.hbuhaug.com/wp-content/uploads/2014/02/BW_India_resubmittedx.pdf>, DOA: 6-24-14, y2k

Abstract: In large parts of the developing world agriculture remains a broad economic sector securing livelihoods for large parts of the population. In the discourse on security implications of climate change, effects on agricultural production and food insecurity are frequently claimed to be a plausible intermediate causal connection. Earlier research has linked economic shocks to conflict outbreak but loss of income from agriculture may also affect dynamics of fighting in ongoing conflicts. We identify three complementary processes through which loss of food production may escalate enduring conflicts: lowered opportunity costs of rebelling, increased opportunities for recruitment, and accentuated and more widespread social grievances. Using India as a test case, we investigate how year-on-year fluctuations in food production affect the severity of ongoing armed conflicts. The statistical analysis shows that harvest loss is robustly associated with increased levels of political violence. To the extent that future climate change will negatively affect local food production and economic activity, it appears that it also has the potential to fuel further fighting in areas that already are scenes of chronic conflict.

#### They will go nuclear

Michael Klare 8 is a professor of peace and world security studies at Hampshire College in Amherst, Mass., and the author of Blood and Oil: The Dangers and Consequences of America's Growing Petroleum Dependency, “The Coming Resource Wars: America's closest ally has announced that climate change has ushered in an era of violent conflict over energy, water and arable land,” March 9, 2006,

<http://www.alternet.org/story/33243/the_coming_resource_wars>, DOA: 6-24-14, y2k

"As famine, disease, and weather-related disasters strike due to abrupt climate change," the Pentagon report notes, "many countries' needs will exceed their carrying capacity" -- that is, their ability to provide the minimum requirements for human survival. This "will create a sense of desperation, which is likely to lead to offensive aggression" against countries with a greater stock of vital resources. "Imagine eastern European countries, struggling to feed their populations with a falling supply of food, water, and energy, eyeing Russia, whose population is already in decline, for access to its grain, minerals, and energy supply." Similar scenarios will be replicated all across the planet, as those without the means to survival invade or migrate to those with greater abundance -- producing endless struggles between resource "haves" and "have-nots." It is this prospect, more than anything, that worries John Reid. In particular, he expressed concern over the inadequate capacity of poor and unstable countries to cope with the effects of climate change, and the resulting risk of state collapse, civil war and mass migration. "More than 300 million people in Africa currently lack access to safe water," he observed, and "climate change will worsen this dire situation" -- provoking more wars like Darfur. And even if these social disasters will occur primarily in the developing world, the wealthier countries will also be caught up in them, whether by participating in peacekeeping and humanitarian aid operations, by fending off unwanted migrants or by fighting for access to overseas supplies of food, oil, and minerals. When reading of these nightmarish scenarios, it is easy to conjure up images of desperate, starving people killing one another with knives, staves and clubs -- as was certainly often the case in the past, and could easily prove to be so again. But these scenarios also envision the use of more deadly weapons. "In this world of warring states," the 2003 Pentagon report predicted, "nuclear arms proliferation is inevitable." As oil and natural gas disappears, more and more countries will rely on nuclear power to meet their energy needs -- and this "will accelerate nuclear proliferation as countries develop enrichment and reprocessing capabilities to ensure their national security."

#### Even if it doesn’t escalate, it triggers a wave of failed states—causes extinction

Lester Brown 9 is a United States environmental analyst, founder of the Worldwatch Institute, and founder and president of the Earth Policy Institute, “Worldwide Crisis: The Geopolitics of Food Scarcity,” <https://www.google.com/search?q=lester+brown&aq=f&oq=lester+brown&aqs=chrome.0.57j60j59j65l2j60.1414&sourceid=chrome&ie=UTF-8>, <http://www.spiegel.de/international/world/worldwide-crisis-the-geopolitics-of-food-scarcity-a-606937.html>, Accessed Date: 3-6-13 y2k

One of the toughest things for us to do is to anticipate discontinuity. Whether on a personal level or on a global economic level, we typically project the future by extrapolating from the past. Most of the time this works well, but occasionally we experience a discontinuity that we failed to anticipate. The collapse of civilization is such a case. It is no surprise that many past civilizations failed to grasp the forces and recognize signs that heralded their undoing. More than once it was shrinking food supplies that brought about their downfall. Does our civilization face a similar fate? Until recently it did not seem possible, but our failure to deal with the environmental trends that are undermining the world food economy -- most importantly falling water tables, eroding soils, and rising temperatures -- forces the conclusion that such a collapse is possible. These trends are taking a significant toll on food production: In six of the last eight years world grain production has fallen short of consumption, forcing a steady drawdown in stocks. World carryover stocks of grain (the amount remaining from the previous harvest when the new harvest begins) have dropped to only 60 days of consumption, a near record low. Meanwhile, in 2008 world grain prices have climbed to the highest level ever. The current record food price inflation puts another severe stress on governments around the world, adding to the other factors that can lead to state failure. Even before the 2008 climb in grain prices, the list of failing states was growing. Now even more governments in many more low and middle-income countries that import grain are in danger of failing as food prices soar. With rising food costs straining already beleaguered states, is it not difficult to imagine how the food crisis could portend the failure of global civilization itself. Today we are witnessing the emergence of a dangerous politics of food scarcity, one in which individual countries act in their narrowly defined self-interest and subsequently accelerate the deterioration of global equilibrium. This began in 2007 when leading wheat-exporting countries such as Russia and Argentina limited or banned exports in an attempt to counter domestic food price rises. Vietnam, the world's second-largest rice exporter after Thailand, banned exports for several months for the same reason. While these moves may reassure those living in exporting countries, they create panic in the scores of countries that import grain.

#### Failed states cause great power conflict and destroys multilateral coop

Grygiel 9 “Vacuum Wars”, July/August 2009, JAKUB GRYGIEL, George H. W. Bush Associate Professor of International Relations at the Paul H. Nitze School of Advanced International Studies at the Johns Hopkins, http://www.the-american-interest.com/article.cfm?piece=622

Mention “failed states” in an academic seminar or a policy meeting and you will hear a laundry list of tragic problems: poverty, disease, famine, refugees flowing across borders and more. If it is a really gloomy day, you will hear that failed states are associated with terrorism, ethnic cleansing and genocide. This is the conventional wisdom that has developed over the past two decades, and rightly so given the scale of the human tragedies in Bosnia, Somalia and Rwanda, just to mention the most egregious cases of the 1990s. This prevailing view of failed states, however, though true, is also incomplete. Failed states are not only a source of domestic calamities; they are also potentially a source of great power competition that in the past has often led to confrontation, crisis and war. The failure of a state creates a vacuum that, especially in strategically important regions, draws in competitive great-power intervention. This more traditional view of state failure is less prevalent these days, for only recently has the prospect of great power competition over failed “vacuum” states returned. But, clearly, recent events in Georgia—as well as possible future scenarios in Iraq, Afghanistan and Pakistan, as well as southeastern Europe, Asia and parts of Africa—suggest that it might be a good time to adjust, really to expand, the way we think about “failed states” and the kinds of problems they can cause. The difference between the prevailing and the traditional view on state failure is not merely one of accent or nuance; it has important policy implications. Intense great power conflict over the spoils of a failed state will demand a fundamentally different set of strategies and skills from the United States. Whereas the response to the humanitarian disasters following state failure tends to consist of peacekeeping and state-building missions, large-scale military operations and swift unilateral action are the most likely strategies great powers will adopt when competing over a power vacuum. On the political level, multilateral cooperation, often within the setting of international institutions, is feasible as well as desirable in case of humanitarian disasters. But it is considerably more difficult, perhaps impossible, when a failed state becomes an arena of great power competition. The prevailing view of failed states is an obvious product of the past two decades—a period in which an entirely new generation of scholars and policymakers has entered their respective professions. A combination of events—the end of the Cold War, the collapse of the Soviet Union and the prostration of states such as Somalia, Rwanda, Haiti and Bosnia, and most importantly the terrorist attacks of September 11—created two interlocked impressions concerning the sources of state failure that are today largely accepted uncritically.

#### Multilat solves every existential challenges

Gwynne **Dyer**, former senior lecturer in war studies at the Royal Military Academy Sandhurst, 12/30/**2004**, The End of War, The Toronto Star, p. lexis

The "firebreak" against nuclear weapons use that we began building after Hiroshima and Nagasaki has held for well over half a century now. But the proliferation of nuclear weapons to new powers is a major challenge to the stability of the system. So are the coming crises, mostly environmental in origin, which will hit some countries much harder than others, and may drive some to desperation. Add in the huge impending shifts in the great-power system as China and India grow to rival the United States in GDP over the next 30 or 40 years and it will be hard to keep things from spinning out of control. With good luck and good management, we may be able to ride out the next half-century without the first-magnitude catastrophe of a global nuclear war, but the potential certainly exists for a major die-back of human population. We cannot command the good luck, but good management is something we can choose to provide. It depends, above all, on preserving and extending the multilateral system that we have been building since the end of World War II. The rising powers must be absorbed into a system that emphasizes co-operationand makes room for them, rather than one that deals in confrontation and raw military power. If they are obliged to play the traditional great-power game of winners and losers, then history will repeat itself and everybody loses.

## 1AC --- Desalination Advantage

#### Water Scarcity is increasing rapidly now- OTEC is the vital method to create freshwater, it’s safe for the environment, the tech exists and it will work immediately

Oney 2013 [Stephen, Dr. is Chief Science Advisor for Ocean Thermal Energy Corporation and has over 25 years of extensive experience in ocean engineering. He is well published on the subjects of Ocean Thermal Energy Conversion (OTEC) and Sea Water District Cooling (SDC), and has been called upon frequently to deliver lectures on these technologies. Dr. Oney has hands-on experience with both OTEC and SDC design and was integral in the research leading to the design and development of the first Net Power Producing Experimental (NPPE) land-based OTEC plant in Hawaii. Ocean Thermal Energy and Water Production <http://empowertheocean.com/ocean-thermal-energy-water-production/>

The scarcity of potable water is a growing problem worldwide, particularly in arid regions and among developing countries. Compounding this problem is the increasing contamination of freshwater sources, which comprise only about 2.5% of all water on Earth. Of this small portion, only 0.5% of the total fresh water available is found in easily accessible sources such as lakes, rivers and aquifers. The rest is frozen in glaciers. The remaining 97.5% is seawater.In the United States alone, each person consumes an average of 400 liters of fresh water per day. That is more than 87 gallons daily per U.S. citizen. By contrast, in other western countries, the consumption level reaches only 150 liters per day. Some countries in Africa have daily consumption rates as low as 20 liters, which is at the World Health Organization’s recommended lower limit for individual survival. When considering infrastructure and communal needs such as those of schools and hospitals, the necessary level is more than doubled to 50 liters per person per day. With the rising global population, industrialization of developing nations and overall increase in quality of life throughout most parts of the world, fresh water consumption levels are rising rapidly. Approximately 67% of the world’s population will be water stressed by 2025, as reported by the UN. According to the United Nations Atlas of the Oceans, more than 44% of the world’s inhabitants live within 150 kilometers of the coast. In the United States, this is true for 53% of the population. In another 30 years, it is estimated that over 70% of the global population will be coastal. The crowding of the population in limited areas inevitably leads to overexploitation of regional resources including fresh water. Given the number of people within access of the coast and the sea, it is naturally advantageous to turn to the ocean for adequate fresh water supplies. Over 75% of the world’s desalinated water capacity is used by the Middle East and North Africa according to the USGS. The United States is one of the most important industrialized countries in terms of desalinated water consumption at about 6.5%. California and Florida are the major consumers of desalinated water in the US. Additionally, populated areas struck by natural disasters are faced with a great need to quickly supply potable water to the victims for drinking, cooking and sanitation purposes. In industrialized nations, the existing freshwater infrastructure is often damaged during a disaster or contaminated to the point that it is unusable in the immediate recovery period. In developing nations, freshwater infrastructure might be entirely absent, making the acquisition and distribution of potable water all the more difficult. Importance of water production in association with OTEC Seawater desalination requires a significant amount of energy regardless of the technique used. There are several renewable energy (RE) technologies currently in use to power desalination processes. Some of these relationships are in commercial operation today; others have yet to be demonstrated. Solar and wind are proven, and tidal and wave energy have very recently begun to show much promise, but are still in the early phases of commercialization. Ocean thermal energy conversion (OTEC) is unique in that it naturally combines opportunities for power production with seawater desalination. Using the temperature differential between warm ocean surface water and cold deep water to generate clean baseload (24/7) renewable energy, in a closed cycle OTEC system, the heat from the surface water is used to boil a working fluid with a low boiling point (such as ammonia), creating steam which turns a turbine generator to produce electricity. The chill from the cold deep water is then used to condense the steam back into liquid form, allowing the system to continuously repeat this process, perpetually fuelled by the sun’s reliable daily heating of the surface water. Because massive amounts of seawater are pumped through an OTEC system in order to generate this baseload (24/7) power, the proximity of the voluminous energy and water supplies allow OTEC to function efficiently and economically with typical thermal desalination processes, as well as those driven solely by electricity. The environmental impact of desalinating seawater is quite high when using fossil fuels. Replacing the energy supply with a renewable energy source, such as OTEC, eliminates the pollution caused by fossil fuels and other problems associated with the use of fossil fuels to produce potable water. Greater self-sufficiency is also achieved through the use of a readily available source of energy like OTEC, making it unnecessary to rely on increasingly expensive fossil fuels imported from often unstable or unfriendly countries. In the last two decades, rising fossil fuel prices and technical advances in the offshore oil industry, many of which are applicable to deep cold water pipe technology for OTEC, mean that small (5-20MW) land-based OTEC plants can now be built with off-the-shelf components, with minimal technology/engineering risks for plant construction and operation. In fact, the authoritative US Government agency NOAA issued a 2009 report concluding that, using a single cold water pipe (CWP), a 10MW OTEC plant is now “technically feasible using current design, manufacturing, deployment techniques and materials.” These two historic changes have now made OTEC electricity pricing increasingly competitive, particularly in tropical island countries where electricity prices, based almost entirely on imported fossil fuels, are currently in the exorbitant range of 30-60 cents/kwh. Adding potable water production to the equation only further improves the economic attractiveness of this technology’s unique symbiosis between clean reliable energy and fresh water. With the growing global need for potable water, the lack of available fresh water sources, increasing concentration of populations in coastal regions, and rising energy prices, pairing potable water production with baseload (24/7) renewable energy from the sea is a natural fit. And with data from the National Renewable Energy Laboratory of the United States Department of Energy indicating that at least 68 countries and 29 territories around the globe are potential candidates for OTEC plants, the technology’s world-wide capacity for fresh water production and CO2 emissions diminution is truly staggering. Although it has not yet reached its commercial potential, OTEC is now a technically and economically viable option that is rapidly emerging not only as a top contender in meeting the energy demand for coastal communities in years to come, but also a major global player in the sustainable potable water generation market as well. While there is certainly truth in the old adage that oil and water do not mix, OTEC is concrete proof that the same cannot be said of energy and water.

#### OTEC’s capabilities are uniquely important to develop desalination plants in water struggled areas

IRENA 2014 [The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. OCEAN THERMAL ENERGY CONVERSION TECHNOLOGY BRIEF http://www.irena.org/DocumentDownloads/Publications/Ocean\_Thermal\_Energy\_V4\_web.pdf

Multifunctionality of OTEC – Besides electricity production, OTEC plants can be used to support air-conditioning, seawater district cooling (SDC), or for aqua culture purposes as illustrated in Figure 4. OTEC plants can also produce fresh water. 1 In Open-Cycle OTEC plants, fresh water can be obtained from the evaporated warm seawater after it has passed through the turbine, and in Hybrid-Cycle OTEC plants it can be obtained from the discharged seawater used to condense the vapour fluid. Another option is to combine power generation with the production of desalinated water. In this case, OTEC power production may be used to provide electricity for a reverse osmosis desalination plant. According to a study by Matesh, nearly 2.28 million litres of desalinated water can be obtained every day for every MW of power generated by a hybrid OTEC system (Matesh, 2010). The production of fresh water alongside electricity production is particularly relevant for countries with water scarcity and where water is produced by the desalination processes. For island nations with a tourism industry, fresh water is also important to support water consumption in the hotels. Based on a case study in the Bahamas, Muralidharan (2012) Ocean Thermal Energy Conversion | Technology Brief 9 calculated that the OTEC plant could produce freshwater at a costs of around USD 0.89/kgallon. In comparison, the costs for large-scale seawater desalination technologies range from USD 2.6-4/kgallon. Given that deep seawater is typically free of pathogens and contaminants, whilst being rich in nutrients (nitrogen, phosphates, etc.), land-based sys - tems could further benefit from the possibility of using the deep seawater for parallel applications, such as cooling for buildings and infrastructure, chilled soil, or seawater cooled greenhouses for agriculture, and enhanced aquaculture among other synergetic uses. Using deep seawater to cool buildings in district cooling configurations, can provide a large and efficient possibility for overall electricity reduction in coastal areas, helping to balance the peak demands in electricity as well as the overall energy demand

#### OTEC is key- has specific design capabilities that allow for it to do its job better than other energy alternatives

IRENA 2014 [The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. OCEAN THERMAL ENERGY CONVERSION TECHNOLOGY BRIEF http://www.irena.org/DocumentDownloads/Publications/Ocean\_Thermal\_Energy\_V4\_web.pdf

OTEC seems most suitable, and economically viable for island countries and remote island states in tropical seas where generation can be combined with other functions, as e.g. , air-conditioning and fresh water production. Several countries are actively pursuing large-scale deployment of OTEC. For example, companies and governments in France, Japan, the Philippines and South Korea have developed roadmaps for OTEC development (Brochard, 2013; Marasigan, 2013; Kim and Yeo, 2013; Okamura, 2013). Furthermore, Indonesia is mapping its OTEC potential (Suprijo, 2012), Malaysia is proposing a new law on ocean thermal energy development (Bakar Jaafar, 2013), and the Philippines has been considering feed-in tariffs for OTEC (NREB, 2012). Moreover, the technical concept for a 10 MW plant has been proven and the economics for scale-up of plants are promising. The advantage over other type of renewables as solar and wind is that OTEC is continuous and can also produce without direct availability of sun or wind. However, there are some challenges that still need to be overcome. For current plants, there are some issues with construction in fragile marine environments, sealing of the different parts of the installation against sea water, maintenance of material in the sea environment, and bio-fouling of the pipes and other parts of the installation. For larger installations, e.g ., 10 MW or even 100 MW, the pipes are of consider - able width – from 4 m to 20 m – which may impact the coastal structure, and more importantly, the transfer of the cold water up and the discharge in the warmer water could affect the marine life in the vicinity of the plant ( e.g. , exhaust water at 3 degrees below surface water temperature could cause algae bloom). Thus, water effluent needs to be discharged at a certain depth, as the discharged cold water at the surface could influence the temperature of the surface water required for power production. This impact could be com - pared with the temperature issues of, for example, a gas-fired power plant

#### Desalination plants solve tech and other distribution concerns

Habibi et al, 1/2/2013 [Azita, Rodrigo Sabato & Pia Schafer, members of Lauder Class of 2014 Water Scarcity: A Daunting Challenge with a Hopeful Future http://knowledge.wharton.upenn.edu/article.cfm?articleid=3164

The problem of uneven distribution becomes obvious when we compare countries rich in water sources (such as Colombia and Canada) to areas suffering from severe scarcity (such as North Africa and the Middle East). According to the UN, approximately 1.2 billion people (or nearly a fifth of the world's population) live in areas of physical scarcity, and another 500 million are approaching this situation. Projections show that, by 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water-stressed conditions.¶ The problem of water being wasted, polluted or managed unsustainably has become a serious issue in the last century, as water use has been growing at more than twice the rate of the increase in population. The UN estimates that water production lost due to leakage, theft and inadequate billing practices ranges from 10% to 30% in developed nations and from 40% to 50% in developing countries. By 2050, untreated wastewater could contaminate a third of global annual renewable freshwater supplies. Including those who currently do not live in areas of physical scarcity, 1.6 billion people face economic water shortages, where countries lack the necessary infrastructure to make water from rivers and aquifers accessible. At the same time, agriculture alone utilizes 15% to 35% of its water in excess of sustainable limits.¶ According to Jiménez, agriculture illustrates the classic case of water mismanagement, where potable water is often used for purposes that could be served by other types of "reutilized" water, preserving the premium water for more vital purposes (i.e., for drinking or personal hygiene). This problem extends beyond agriculture, given that many parts of the world use the same premium, potable water from the faucet to flush toilets.¶ Finally, there is also a growing need for investment in infrastructure to deliver water to the end users and to transport wastewater back to treatment plants. The vast network of pipes in developed countries is deteriorating quickly and is in urgent need of repair. The situation is even worse in the developing world, where basic infrastructure is still lacking, particularly for wastewater treatment. In many parts of the world, poor urban residents still buy water from trucks because there is no piped tap water for their homes. Jiménez stated that people often do not realize how costly it is to bring water to their taps and that the prices they pay in water tariffs do not reflect the full costs associated with the processes.¶ Water scarcity is a complex and challenging problem, especially in light of ever-increasing global demands. Jiménez, however, pointed to the continuous investment in searching for new sources of water, such as desalination technologies, as one of the few foreseeable solutions

#### OTEC is key to resolving water scarcity in many areas of the world, including India- it will resolve many of their water problems- OTEC is the best way to resolve the problems with India’s water technology

Venkateswaran 2010 [T.V. PHD, Energy from the oceans, http://www.vigyanprasar.gov.in/Radioserials/Energy%20from%20the%20oceans.pdf]

OTEC plants could be floating or land - based. Floating plants have the advantage that they are closer to the deep cold water and the cost of the piping and pumping will be less. However, floating plants are vulnerable to storms and the electricity which is generated has to be brought ashore. A l and - based OTEC system will not require the long power transmission cable, but instead the warm and cold water will have to be brought onshore. There is the possibility that the cold water will warm up so reducing the efficiency of the power generation. Th e amount of ocean thermal energy is vast, none of the other alternatives to fossil fuel can even come close to the magnitude of the OTEC resource. And, unlike wind or wave power, OTEC offers energy in constant supply, available day and night regardless of the weather and with only a small seasonal variation. For an OTEC plant to work efficiently there must be a temperature difference of more than 20°C between the surface water and the cool deep water and this is only found within tropical and sub - tropical o ceans. However, in this zone are the southern states of the USA and parts of Australia, as well as many developing nations including India which is increasingly using more fossil fuel to generate electricity. Tropical islands would particularly benefit fro m OTEC, because oil - fired power is expensive and there is usually a need for desalinated water. Unlike other clean energy technologies, OTEC has some useful by - products. OTEC plants can be used to produce fresh water from seawater. In the open - cycle syste m, warm water is vaporised when it is subjected to a low pressure. The salt is left behind and the condensed steam is almost pure water. The desalination produced by OTEC in this way is effectively free. Indian efforts: In India Dr. Subramaniyam Kathirol i and his team at National Institute of Ocean Technology (NIOT) tried to set up an experimental plant for generation of electricity using the ocean thermal energy at the Bay of Bengal in 2003. Alas the pipes, about 800 meters long were washed by the ocean currents. Again they tried next year, yet again failure. Tight budget and lack of sufficient infrastructure the task became difficult. Bad weather compounded the problems. Two attempts of deploying the 800 m long and 1 m diameter cold water pipe in 1100 me ter water depths failed. Mooring of the barrage in severe weather condition was also proving to be critical. Even when the power was generated transfer of the same to shore was yet another design difficulty. Failures did not deter them. Rather they starte d to think laterally. D ifficulties in transfer of power to shore and economics led to rethinking. W hy not use the e nergy by - passing the electric power conversion? Many coastal places and islands are in need of drinking water and natural sources are either absent or inadequate. Trend towards desalination of sea water is seen. Kathiroli and others also thought of designing Low Temperature Thermal Desalination plant. The energy produced by OTEC could be used; and it need not be converted into electricity and sent to shore. Rather the energy could be directly used to purify sea water and potable water could be sent offshore. NIOT under Kathiroli constructed a Barge Mounted LTTD plant off Tuticorin . The plant had a capacity of 100 m3 per day. The project s ucces sfully demonstrated continuous production of good quality fresh water . Impelled by the success, one lakh litre LTTD was commissioned successfully at Kavaratti . NIOT's recently unveiled barge - mounted desalination plant, produces one million lit re s a day at about 6 paise per litre. The team is confident that they would be able to scale up and establish a p lant with 25 million litres per day capacity and should be able to produce water at just 3 paise per litre . World over total electricity generation is abou t 125 GW. Estimated OTEC energy potential within Indian EEZ through OTEC is alone 200 GW. Thus indeed OTEC could become a significant contribution for meeting the energy needs of future. Though recent success of OTEC has been in establishment of LTTD , elec tricity generation is not off the burner. World ’ s leading aerospace engineers are involved in designing suitable fibreglass pipes that could be practically used in ocean. Even if some power could be generate using the ocean energy then one could at least r educe that much dependence on the coal and petroleum.

#### Water disagreements are the main point of tension for India and Pakistan

Polgreen & Tavernise 2010 [Lydia, Johannesburg bureau chief for the New York Times, covering southern Africa Sabrina, New York Times, Water Dispute Increases India-Pakistan Tension <http://www.nytimes.com/2010/07/21/world/asia/21kashmir.html?pagewanted=all&_r=0>

This time it is not the ground underfoot, which has been disputed since the bloody partition of British India in 1947, but the water hurtling from mountain glaciers to parched farmers’ fields in Pakistan’s agricultural heartland. Indian workers here are racing to build an expensive hydroelectric dam in a remote valley near here, one of several India plans to build over the next decade to feed its rapidly growing but power-starved economy. In Pakistan, the project raises fears that India, its archrival and the upriver nation, would have the power to manipulate the water flowing to its agriculture industry — a quarter of its economy and employer of half its population. In May it filed a case with the international arbitration court to stop it. Water has become a growing source of tension in many parts of the world between nations striving for growth. Several African countries are arguing over water rights to the Nile. Israel and Jordan have competing claims to the Jordan River. Across the Himalayas, China’s own dam projects have piqued India, a rival for regional, and even global, power. But the fight here is adding a new layer of volatility at a critical moment to one of the most fraught relationships anywhere, one between deeply distrustful, nuclear-armed nations who have already fought three wars. The dispute threatens to upset delicate negotiations to renew peace talks, on hold since Pakistani militants killed at least 163 people in attacks in Mumbai, India, in November 2008. The United States has been particularly keen to ease tensions so that Pakistan can divert troops and matériel from its border with India to its frontier with Afghanistan to fight Taliban insurgents. Anti-India nationalists and militant networks in Pakistan, already dangerously potent, have seized on the issue as a new source of rage to perpetuate 60 years of antagonism. Jamaat-u-Dawa, the charity wing of Lashkar-e-Taiba, the militant group behind the Mumbai attacks, has retooled its public relations effort around the water dispute, where it was once focused almost entirely on land claims to Kashmir. Hafiz Saeed, Jamaat’s leader, now uses the dispute in his Friday sermons to whip up fresh hatreds. With their populations rapidly expanding, water is critical to both nations. Pakistan contains the world’s largest contiguous irrigation system, water experts say. It has also become an increasingly fertile recruiting ground for militant groups, who play on a lack of opportunity and abundant anti-India sentiment. The rivers that traverse Punjab, Pakistan’s most populous province and the heart of its agriculture industry, are the country’s lifeline, and the dispute over their use goes to the heart of its fears about its larger, stronger neighbor. For India, the hydroprojects are vital to harnessing Himalayan water to fill in the serious energy shortfalls that crimp its economy. About 40 percent of India’s population is off the power grid, and lack of electricity has hampered industry. The Kishenganga project is a crucial part of India’s plans to close that gap. The Indian project has been on the drawing board for decades, and it falls under a 50-year-old treaty that divides the Indus River and its tributaries between both countries. “The treaty worked well in the past, mostly because the Indians weren’t building anything,” said John Briscoe, an expert on South Asia’s water issues at Harvard University. “This is a completely different ballgame. Now there’s a whole battery of these hydroprojects.” The treaty, the result of a decade of painstaking negotiation that ended in 1960, gave Pakistan 80 percent of the waters in the Indus River system, a ratio that nationalists in Pakistan often forget. India, the upriver nation, is permitted to use some of the water for farming, drinking and power generation, as long as it does not store too much. While the Kishenganga dam is allowed under the treaty, the dispute is over how it should be built and the timely release of water. Pakistan contends that having the drainage at the very base of the dam will allow India to manipulate the water flow when it wants, for example, during a crucial period of a planting season. “It makes Pakistan very vulnerable,” said a lawyer who has worked on past water cases for Pakistan. “You can’t just tell us, ‘Hey, you should trust us.’ We don’t. That’s why we have a treaty.” India has rejected any suggestion that it has violated the treaty or tried to steal water. In a speech on June 13, India’s foreign secretary, Nirupama Rao, called such allegations “breast-beating propaganda,” adding “the myth of water theft does not stand the test of rational scrutiny or reason.” Water experts concur, but say Pakistan does have a legitimate cause for concern. The real issue is timing. If India chooses to fill its dams at a crucial time for Pakistan, it has the potential to ruin a crop. Mr. Briscoe estimates that if India builds all its planned projects, it could have the capacity of holding up about a month’s worth of river flow during Pakistan’s critical dry season, enough to wreck an entire planting season. Here in Bandipore, where engineers and laborers work long shifts to build the powerhouse and tunnel for the long-awaited dam, the work is not merely a matter of electricity. National pride is at stake, they said. “This dam is a matter of our national prestige,” one of the engineers on the project said. “It is our right to build this dam, and our future depends on it.” Pakistanis say they have reason to be worried. In 1948, a year after Pakistan and India were established as states, an administrator in India shut off the water supply to a number of canals in Pakistani Punjab. Indian authorities later said it was a bureaucratic mix-up, but in Pakistan, the memory lingers. “Once you’ve had a gun put to your head and it’s been cocked, you don’t forget it,” said the Pakistani lawyer, who asked that his name not be used because he was not part of the current legal team. A genuine water shortage in Pakistan, and the country’s inability to store large quantities of water, has only made matters worse, exposing it to any small variation in rainfall or river flow. Pakistan is about to slip into a category of country the United Nations defines as “water scarce.” “They are confronting a very serious water issue,” said a senior American official in Islamabad. “There’s a high amount of anxiety, and it’s not misplaced.” The design of the dam requires that much of the water in the Kishenganga River be diverted for much of the year. That will kill off fish and harm the livelihoods of the people living in the Pakistan-administered side of Kashmir, Pakistani officials say. Kaiser Bengali, an economist, argues that Pakistan’s water crisis has little to do with India, and says that the real way to ease it is to introduce water conservation methods and modern farming techniques. In a country where summer temperatures reach 120 degrees, as much as 40 percent of Pakistan’s water is lost before even reaching the roots of the plants, experts say. The water dispute would not be nearly as acute, experts said, if India and Pakistan talked and shared data on water. Instead, the distrust and antagonism is such that bureaucrats have hoarded information, and are secretly gunning to finish projects on either side of the line of control in order to be the first to have an established fact on the ground. “It’s like a bad marriage in which we have proscribed roles,” the Pakistani lawyer said. “Would it be better if we were communicating openly? Yes. But in the present circumstances we are not.”

#### Desal is key to resolve indo-pak water shortages, stops the risng conflicts

Brinkley 2013 [Joel is the Hearst professional in residence at Stanford University and a Pulitzer Prize-winning former correspondent for the New York Times. Avert water wars - build desalination plants <http://www.sfgate.com/opinion/brinkley/article/Avert-water-wars-build-desalination-plants-5002898.php>

Get ready for the water wars. Most of the world's population takes water for granted, just like air - two life-sustaining substances. After all, the human body is nearly two-thirds water. But a Hindustan Times blogger said that in India right now, as in so many other places around the globe, drinkable water has become such a precious commodity that it's dragging the world into "water wars to follow the ones for the control of fuel oil." Climate change is drying up lakes and rivers almost everywhere. In Australia, for example, an unprecedented heat wave brought on massive wildfires and critical water shortages. As water grows scarce, more countries are building dams on rivers to hog most of the water for themselves, depriving the nations downstream. Already, Egypt had threatened to bomb the Grand Renaissance Dam upstream on the Nile River in Ethiopia. And as the Earth's population crossed the 7 billion mark last year, more and more water sources are so polluted that drinking the water can kill you. No one's counting, but various government and private estimates indicate that worldwide, tens of thousands of children die every day from drinking contaminated water. By most estimates, half the world's people live in places where clean water is not easily available. Bangalore, India, for example once had 400 lakes in its vicinity. Now, the New Indian Express newspaper wrote, only 40 are left, and all of them are polluted. Hence the fights. One of the biggest areas of conflict is the India-Pakistan-China nexus. Multiple rivers intertwine the countries, and as water levels fall, all three are building dams to keep much of the water for themselves. China has built more dams than any other nation, making numerous countries angry because Chinese rivers flow into more adjacent states than from any other state. And yet, even with 14 different downstream border states, China refuses to agree to any water treaties. Right now, China has approved plans to build 54 more dams on rivers, many of which serve as the lifeblood of neighboring states. In China's north, "desertification" is turning vast areas into dust bowls. So the government is trying to divert 6 trillion gallons of water per year from the Yangtze River to reclaim the area, worrying people in other parts of China who rely on the Yangtze for their own water. In Iran, farmers in one region destroyed a water-pump station that was carrying water away from their area to the city of Yazd. That started a fight with security forces, but the farmers are remaining on station to make sure the pump is not rebuilt. A recent NASA study warned of an "alarming rate of decrease in total water storage" in Iraq's "Tigris and Euphrates river basins, which currently have the second-fastest rate of groundwater storage loss on Earth, after India." The report warned that water scarcity could become another cause of conflict. Egypt's military threats against Ethiopia begin to make sense when you realize that Egypt's 84 million people draw 95 percent of their water from the Nile River. A common saying is that without the Nile there is no Egypt. The U.S. House of Representatives recently held a hearing on water shortages and other threats in Central Asia, and Rep. Dana Rohrabacher, R-Costa Mesa (Orange County), warned of another potential conflict, quoting Uzbekistan's president, Islam Karimov: "Uzbekistan will even use weapons if necessary" against its northern neighbor Kazakhstan "to get the water passing through (Kyrgyzstan) territory that we intend to accumulate in reservoirs." In Sri Lanka this month, the Daily News wrote: "We can live many days without food, but without water it is about three days." Still, "we can't seem to get the right water to the right people at the right time. ... More people have access to cell phones than safe water." So where is all this water going? With ever-rising temperatures, more and more water evaporates and returns to the ground as rain. But most of it falls into the oceans. That's one reason sea levels are rising worldwide, threatening vast coastal areas. But all of that leaves the world with an expensive but straightforward solution to the water-shortage problem everywhere. Build desalination plants, as Australia, Israel, Saudi Arabia and other well-off, water-stressed states are already doing. Soon enough, whichever country starts marketing these critically important plants worldwide will make a lot of money and grow to be seen as a savior for millions of the world's people.

#### Water Scarcity will be the flashpoint for an India-Pakistan War

Zahoor ‘11Musharaf, is researcher at Department of Nuclear Politics, National Defence University, Islamabad, “Water crisis can trigger nuclear war in South Asia,” <http://www.siasat.pk/forum/showthread.php?77008-Water-Crisis-can-Trigger-Nuclear-War-in-South-Asia>,

South Asia is among one of those regions where water needs are growing disproportionately to its availability. The high increase in population besides large-scale cultivation has turned South Asia into a water scarce region. The two nuclear neighbors Pakistan and India share the waters of Indus Basin. All the major rivers stem from the Himalyan region and pass through Kashmir down to the planes of Punjab and Sindh empty into Arabic ocean. It is pertinent that the strategic importance of Kashmir, a source of all major rivers, for Pakistan and symbolic importance of Kashmir for India are maximum list positions. Both the countries have fought two major wars in 1948, 1965 and a limited war in Kargil specifically on the Kashmir dispute. Among other issues, the newly born states fell into water sharing dispute right after their partition. Initially under an agreed formula, Pakistan paid for the river waters to India, which is an upper riparian state. After a decade long negotiations, both the states signed Indus Water Treaty in 1960. Under the treaty, India was given an exclusive right of three eastern rivers Sutlej, Bias and Ravi while Pakistan was given the right of three Western Rivers, Indus, Chenab and Jhelum. The tributaries of these rivers are also considered their part under the treaty. It was assumed that the treaty had permanently resolved the water issue, which proved a nightmare in the latter course. India by exploiting the provisions of IWT started wanton construction of dams on Pakistani rivers thus scaling down the water availability to Pakistan (a lower riparian state). The treaty only allows run of the river hydropower projects and does not permit to construct such water reservoirs on Pakistani rivers, which may affect the water flow to the low lying areas. According to the statistics of Hydel power Development Corporation of Indian Occupied Kashmir, India has a plan to construct 310 small, medium and large dams in the territory. India has already started work on 62 dams in the first phase. The cumulative dead and live storage of these dams will be so great that India can easily manipulate the water of Pakistani rivers. India has set up a department called the Chenab Valley Power Projects to construct power plants on the Chenab River in occupied Kashmir. India is also constructing three major hydro-power projects on Indus River which include Nimoo Bazgo power project, Dumkhar project and Chutak project. On the other hand, it has started Kishan Ganga hydropower project by diverting the waters of Neelum River, a tributary of the Jhelum, in sheer violation of the IWT. The gratuitous construction of dams by India has created serious water shortages in Pakistan. The construction of Kishan Ganga dam will turn the Neelum valley, which is located in Azad Kashmir into a barren land. The water shortage will not only affect the cultivation but it has serious social, political and economic ramifications for Pakistan. The farmer associations have already started protests in Southern Punjab and Sindh against the non-availability of water. These protests are so far limited and under control. The reports of international organizations suggest that the water availability in Pakistan will reduce further in the coming years. If the situation remains unchanged, the violent mobs of villagers across the country will be a major law and order challenge for the government. The water shortage has also created mistrust among the federative units, which is evident from the fact that the President and the Prime Minister had to intervene for convincing Sindh and Punjab provinces on water sharing formula. The Indus River System Authority (IRSA) is responsible for distribution of water among the provinces but in the current situation it has also lost its credibility. The provinces often accuse each other of water theft. In the given circumstances, Pakistan desperately wants to talk on water issue with India. The meetings between Indus Water Commissioners of Pakistan and India have so far yielded no tangible results. The recent meeting in Lahore has also ended without concrete results. India is continuously using delaying tactics to under pressure Pakistan. The Indus Water Commissioners are supposed to resolve the issues bilaterally through talks. The success of their meetings can be measured from the fact that Pakistan has to knock at international court of arbitration for the settlement of Kishan Ganga hydropower project. The recently held foreign minister level talks between both the countries ended inconclusively in Islamabad, which only resulted in heightening the mistrust and suspicions. The water stress in Pakistan is increasing day by day. The construction of dams will not only cause damage to the agriculture sector but India can manipulate the river water to create inundations in Pakistan. The rivers in Pakistan are also vital for defense during wartime. The control over the water will provide an edge to India during war with Pakistan. The failure of diplomacy, manipulation of IWT provisions by India and growing water scarcity in Pakistan and its social, political and economic repercussions for the country can lead both the countries toward a war. The existent A-symmetry between the conventional forces of both the countries will compel the weaker side to use nuclear weapons to prevent the opponent from taking any advantage of the situation. Pakistan's nuclear programme is aimed at to create minimum credible deterrence. India has a declared nuclear doctrine which intends to retaliate massively in case of first strike by its' enemy. In 2003, India expanded the operational parameters for its nuclear doctrine. Under the new parameters, it will not only use nuclear weapons against a nuclear strike but will also use nuclear weapons against a nuclear strike on Indian forces anywhere. Pakistan has a draft nuclear doctrine, which consists on the statements of high ups. Describing the nuclear thresh-hold in January 2002, General Khalid Kidwai, the head of Pakistan's Strategic Plans Division, in an interview to Landau Network, said that Pakistan will use nuclear weapons in case India occupies large parts of its territory, economic strangling by India, political disruption and if India destroys Pakistan's forces. The analysis of the ambitious nuclear doctrines of both the countries clearly points out that any military confrontation in the region can result in a nuclear catastrophe. The rivers flowing from Kashmir are Pakistan's lifeline, which are essential for the livelihood of 170 million people of the country and the cohesion of federative units. The failure of dialogue will leave no option but to achieve the ends through military means.

#### Conflict goes nuclear

Suri 1/12 The nuclear nightmare, Manil Suri Jan 12, 2014, a professor of mathematics and affiliate professor of Asian studies at the University of Maryland, http://articles.timesofindia.indiatimes.com/2014-01-12/deep-focus/46112370\_1\_indian-mujahideen-death-toll-dirty-bomb

Can terrorists get their hands on an N-bomb in Pakistan? The Bhatkal scenario sounds fanciful but there is no denying that South Asia is a risky flashpoint. Last week, the captured Indian Mujahideen leader Yasin Bhatkal revealed he had asked his Pakistani boss for a "small nuclear bomb" to detonate in Surat. "Anything can be arranged in Pakistan ," his boss is reputed to have replied. What if such a terrorist nuclear device were, indeed, to go off in Surat? Anything acquired from the Pakistani arsenal would not be "small" but rather, comparable to the 15 kiloton Hiroshima bomb. The death toll would be significantly higher due to Surat's greater population density, and because a ground detonation can lead to radioactive fallout. A less catastrophic scenario might involve a homemade "dirty" bomb, using radioactive material appropriated from medical equipment. Although the physical damage would now be quite localized , the resulting panic and outrage might again outstrip anything seen in previous terrorist attacks. In either case, India would be faced with the same difficult question: how to react? So far, India's policy on terrorism has been one of restraint: the response has never been a full-scale military attack, aimed at inflicting sufficiently costly losses to make Pakistan abandon its policy of tolerating terrorist groups. The reason is pragmatism: Pakistan, which has significantly weaker conventional military power, has set a low threshold for the use of nuclear weapons in case it is overwhelmed by India in a conventional war. With enough nuclear warheads to wipe each other out, India and Pakistan are in a classic configuration of mutually assured destruction. The danger of nuclear escalation has made the cost of starting even a conventional war too high, no matter what the provocation. But what if the provocation itself was nuclear, like an atomic device exploding in Surat, or even a dirty bomb? What government would be able to adhere to a policy of restraint in the face of the frenzied calls for revenge sure to follow? If India retaliated in kind, with even the most limited nuclear action, the experience with NATO war games shows that the end result would probably be a full scale nuclear exchange. With 100 detonations (about half the current combined arsenal), not only would several million Indians and Pakistanis be instantly killed, but atmospheric soot would precipitate a worldwide nuclear famine, causing up to two billion additional starvation deaths. Clearly, the only viable option is to never have to find out the Indian response. Could the terrorist acquisition of a nuclear bomb indeed be "arranged" in Pakistan ? Over the years, the international community has repeatedly focused on the security of the Pakistani nuclear arsenal, with the US providing substantial aid to enhance protection. Pakistan insists its weapons are safe, a position the US State Department has endorsed. Even if terrorists were able to lay their hands on one, detonating a nuclear device is a highly complex procedure, with several safety mechanisms in place to prevent unauthorized activation. The only plausible situation where all security measures might be overcome would be if Pakistan were to degenerate into a completely failed state. Dirty bombs present their own difficulties . Radioactive materials cannot be easily handled without specialized equipment, and there are issues with transportability as well as dispersion mechanisms to cause sufficient contamination. Certainly, no dirty bomb has ever been successfully deployed. Under current conditions, therefore, the Bhatkal scenario appears quite fanciful. And yet, it is a reminder of the issues at stake. South Asia is perhaps the riskiest nuclear flashpoint in the world, an image that the region's population has not sufficiently assimilated. Given Pakistan's strategic needs, it is unlikely to ever relinquish its nuclear arsenal. A more attainable goal would be to convince both sides to take weapons off high alert status, so that cooler heads can prevail in terms of crisis. Restraint, rather than emotion, is needed to ensure the nuclear red line is never crossed.

## 1AC --- Warming Advantage

#### Contention \_\_: Warming

#### OTEC is key to reduce CO2 - solves both power plants and vehicle emissions

Magesh 10 [R., Coastal Energ Pvt, "OTEC TEchnology - A World of Clean Energy and Water," World Congress on Engineering, Vol II, June 30]

Scientists all over the world are making predictions about the ill effects of Global warming and its consequences on the mankind. Conventional Fuel Fired Electric Power Stations contribute nearly 21.3% of the Global Green House Gas emission annually. Hence, an alternative for such Power Stations is a must to prevent global warming. One fine alternative that comes to the rescue is the Ocean thermal energy conversion (OTEC) Power Plant, the complete Renewable Energy Power Station for obtaining Cleaner and Greener Power. Even though the concept is simple and old, recently it has gained momentum due to worldwide search for clean continuous energy sources to replace the fossil fuels. The design of a 5 Megawatt OTEC Pre-commercial plant is clearly portrayed to brief the OTEC technical feasibility along with economic consideration studies for installing OTEC across the world. OTEC plant can be seen as a combined Power Plant and Desalination plant. Practically, for every Megawatt of power generated by hybrid OTEC plant, nearly 2.28 million litres of desalinated water is obtained every day. Its value is thus increased because many parts of the globe are facing absolute water scarcity. OTEC could produce enough drinking water to ease the crisis drought-stricken areas. The water can be used for local agriculture and industry, any excess water being given or sold to neighboring communities. Index Terms—Desalinated water, Ocean Temperature Differences, Rankine Cycle, Renewable Energy. I. INTRODUCTION CEAN thermal energy conversion is a hydro energy conversion system, which uses the temperature difference that exists between deep and shallow waters in tropical seas to run a heat engine. The economic evaluation of OTEC plants indicates that their commercial future lies in floating plants of approximately 100 MW capacity for industrialized nations and smaller plants for small-island-developing-states (SIDS). The operational data is needed to earn the support required from the financial community and developers. Considering a 100 MW (4-module) system, a 1/5-scaled version of a 25 MW module is proposed as an appropriate size. A 5 MW precommercial plant is directly applicable in some SIDS. OTEC works on Rankine cycle, using a low-pressure turbine to generate electric power. There are two general types of OTEC design: closed-cycle plants utilize the evaporation of a working fluid, such as ammonia or propylene, to drive the turbinegenerator, and open-cycle plants use steam from evaporated R. Magesh is with Coastal Energen Pvt. Ltd., Chennai 600 006, Tamilnadu, India (e-mail: wellingtonmagesh@ gmail.com). sea water to run the turbine. Another commonly known design, hybrid plants, is a combination of the two. In fact, the plants would cool the ocean by the same amount as the energy extracted from them. Apart from power generation, an OTEC plant can also be used to pump up the cold deep sea water for air conditioning and refrigeration, if it is brought back to shore. In addition, the enclosed sea water surrounding the plant can be used for aquaculture. Hydrogen produced by subjecting the steam to electrolysis during the OTEC process can fuel hybrid automobiles, provided hydrogen can be transported economically to sea shore. Another undeveloped opportunity is the potential to mine ocean water for its 57 elements contained in salts and other forms and dissolved in solution. The initial capital cost of OTEC power station would look high, but an OTEC plant would not involve the wastetreatment or astronomical decommissioning costs of a nuclear facility. Also, it would offset its expense through the sale of the desalinated water.

#### OTEC stops climate change through carbon sequestration

Barry 8 [Christopher, Naval Architect and Co-Chair of the Society of Naval Architects and Marine Engineers, “Ocean Thermal Energy Conversion and CO2 Sequestration,” July 1, http://renewenergy.wordpress.com/2008/07/01/ocean-thermal-energy-conversion-and-co2-sequestration/]

However, deep cold water is laden with nutrients. In the tropics, the warm surface waters are lighter than the cold water and act as a cap to keep the nutrients in the deeps. This is why there is much less life in the tropical ocean than in coastal waters or near the poles. The tropical ocean is only fertile where there is an upwelling of cold water. One such upwelling is off the coast of Peru, where the Peru (or Humboldt) Current brings up nutrient laden waters. In this area, with lots of solar energy and nutrients, ocean fertility is about 1800 grams of carbon uptake per square meter per year, compared to only 100 grams typically. This creates a rich fishery, but most of the carbon eventually sinks to the deeps in the form of waste products and dead microorganisms. This process is nothing new; worldwide marine microorganisms currently sequester about forty billion metric tonnes of carbon per year. They are the major long term sink for carbon dioxide. In a recent issue of Nature, Lovelock and Rapley suggested using wave-powered pumps to bring up water from the deeps to sequester carbon. But OTEC also brings up prodigious amounts of deep water and can do the same thing. In one design, a thousand cubic meters of water per second are required to produce 70 MW of net output power. We can make estimates of fertility enhancement and sequestration, but a guess is that an OTEC plant designed to optimize nutrification might produce 10,000 metric tonnes of carbon dioxide sequestration per year per MW. The recent challenge by billionaire Sir Richard Branson is to sequester one billion tonnes of carbon dioxide per year in order to halt global warming, so an aggressive OTEC program, hundreds of several hundred MW plants might meet this.

#### We’re at the threshold of irreversible warming—this decade is critical.

Nina **Chestney 12** is Reuters Staff. “Global warming close to becoming irreversible: scientists” 3-27-12 <http://www.reuters.com/article/2012/03/27/us-climate-thresholds-idUSBRE82Q18720120327> accessed date: 7-18-12 y2k

Scientific estimates differ but the world's temperature looks set to rise by six degrees Celsius by 2100 ifgreenhouse gas emissions are allowed torise uncontrollably.¶ As emissions grow, scientists say the world is close to reachingthresholdsbeyond which the effects on the global climate will beirreversible, such as the melting of polar ice sheets and loss of rainforests.¶ "This is the critical decade. If we don't get the curves turned aroundthis decade we will cross those lines," said Will Steffen, executive director of the Australian National University's climate change institute, speaking at a conference in London.¶ Despite this sense of urgency, a new global climate treaty forcing the world's biggest polluters, such as the United States and [China](http://www.reuters.com/places/china), to curb emissions will only be agreed on by 2015 - to enter into force in 2020.¶ " We are on the cusp of some big changes," said Steffen. "We can ... cap temperature rise at two degrees, orcross the threshold beyond which the system shifts to a much hotter state."¶ For ice sheets - huge refrigerators that slow down the warming of the planet - the tipping point has probably already been passed, Steffen said. The West Antarcticice sheet has shrunk over the last decade and the Greenland ice sheet has lost around 200 cubic km (48 cubic miles) a year since the 1990s.¶ Most climate estimates agreethe Amazon rainforest will get drier as the planet warms. Mass tree deaths caused by drought haveraised fears it is on the verge of a tipping point, when it will stop absorbing emissions and add to them instead.¶ Around 1.6 billion tonnes of carbon were lost in 2005 from the rainforest and 2.2 billion tonnes in 2010, which has undone about 10 years of carbon sink activity, Steffen said.¶ One of the most worrying and unknown thresholds is the Siberian permafrost, which stores frozen carbon in the soil away from the atmosphere.¶ "There is about 1,600 billion tonnes of carbon there - about twice the amount in the atmosphere today - and the northern high latitudes areexperiencing the most severe temperature changeof any part of the planet," he said.¶ In a worst case scenario, 30 to 63 billion tonnes of carbon a year could be released by 2040, rising to 232 to 380 billion tonnes by 2100. This compares to around 10 billion tonnes of carbon released by fossil fuel use each year.¶ Increased CO2 in the atmosphere has also turned oceansmore acidicas they absorb it. In the past 200 years, ocean acidification has happened at a speed not seen for around 60 million years, said Carol Turley at Plymouth Marine Laboratory.¶ This threatens coral reef development and could lead to the extinction of some species within decades, as well as to an increase in the number of predators.¶ As leading scientists, policy-makers and environment groups gathered at the "Planet Under Pressure" conference in London, opinions differed on what action to take this decade.¶ London School of Economics professor Anthony Giddens favors focusing on the fossil fuel industry, seeing as renewables only make up 1 percent of the global energy mix.¶ "We have enormous inertia within the world economy and should make much more effort to close down coal-fired power stations," he said.¶ Oil giant Royal Dutch Shell favors working on technologies leading to negative emissions in the long run, like carbon capture on biomass and in land use, said Jeremy Bentham, the firm's vice president of global business environment.¶ The conference runs through Thursday.

#### Anthropogenic global warming will cause extinction and turns their impact.

**Stone**, **11**—George, Ph.D, Professor of Science at Milwaukee Area Technical College, “CLIMATE CHANGE MITIGATION: PLANETARY IMPERATIVE AND GEOSCIENCE RESPONSIBILITY” Presentation at 2011 Geological Society of America’s Annual Meeting in Minneapolis Paper No. 238-9 <http://gsa.confex.com/gsa/2011AM/finalprogram/abstract_196986.htm> accessed date: 5-18-12 y2k

Evidence confirming the reality of anthropogenic global warming and its manifold impacts has surpassed the standard of reasonable doubt. Rapid changes in atmospheric chemistry are elevating ecosystem stress, including ocean acidification that endangers the marine food web. These anthropogenic impacts threaten dramatic expansion ofEarth’s sixth great extinction episode. Climate perturbations also threaten vital water and agricultural resources and coastal habitats for human populations, thereby exacerbating problems of povertyand population growth and undermining political stability both regionally and globally. They may constitutean irreversiblethreat to the survival of human civilization as we know it. As human activities relentlesslydrive upgreenhouse gas concentrations, forcing our planet’s climate system toward -- and perhaps beyond -- irreversible tipping points, the challenge to reduce these dangerous emissions is ever more compelling. In its position statement on climate change, GSA concurs with assessments by theNational Academies of Science (2005), the National Research Council (2006), and theIntergovernmental Panel on Climate Change (IPCC, 2007) that global climate haswarmed and that human activities (mainly greenhouse-gas emissions) accountfor most of the warming since the middle 1900s. Among GSA’s recommendations are (1) public policy should include effective strategies for the reduction of greenhouse gas emissions, and (2) comprehensive local, state, national and international planning is needed to address challenges posed by future climate change.Mitigation of climate change is now a planetary imperative of the highest priority. The international community has failed to reach agreement on a framework for climate change mitigation beyond 2012. Action at every level requires political will enabled by public understanding of the problem. Climate and energy literacy are essential to reaching the levels of resource commitment and economic transformation that this challenge demands. It is incumbent upon the scientific and academic communities -- especially in the geosciences -- to embrace responsibility and assume leadership in providing clear communication of the magnitude and immediacy of the climate challenge to the society that supports them!

#### Independently, warming causes ocean collapse—extinction.

**McCarthy 11**—Michael McCarthy is Independent’s environment editor. “Oceans on brink of catastrophe: Marine life facing mass extinction 'within one human generation' / State of seas 'much worse than we thought', says global panel of scientists” 21 June 2011

Accessed date” 8-19-12 y2k

The world's oceans are faced with an unprecedented loss of species comparable to the great mass extinctions of prehistory, a major report suggests today. The seas are degenerating far faster than anyone has predicted, the report says, because of the cumulative impact of a number of severe individual stresses, ranging from climate warming and sea-water acidification, to widespread chemical pollution and gross overfishing.The coming together of these factors is now threatening the marine environment with a catastrophe "unprecedented in human history", according to the report, from a panel of leading marine scientists brought together in Oxford earlier this year by the International Programme on the State of the Ocean (IPSO) and the International Union for the Conservation of Nature (IUCN).The stark suggestion made by the panel is that the potential extinction of species, from large fish at one end of the scale to tiny corals at the other, is directly comparable to the five great mass extinctions in the geological record, during each of which much of the world's life died out. They range from the Ordovician-Silurian "event" of 450 million years ago, to the Cretaceous-Tertiary extinction of 65 million years ago, which is believed to have wiped out the dinosaurs. The worst of them, the event at the end of the Permian period, 251 million years ago, is thought to have eliminated 70 per cent of species on land and 96 per cent of all species in the sea.The panel of 27 scientists, who considered the latest research from all areas of marine science, concluded that a "combination of stressors is creating the conditions associated with every previous major extinction of species in Earth's history". They also concluded:\* The speed and rate of degeneration of the oceans is far faster than anyone has predicted;\* Many of the negative impacts identified are greater than the worst predictions;\* The first steps to globally significant extinction may have already begun."The findings are shocking," said Dr Alex Rogers, professor of conservation biology at Oxford University and IPSO's scientific director. "As we considered the cumulative effect of what humankind does to the oceans, the implications became far worse than we had individually realised."This is a very serious situation demanding unequivocal action at every level.We are looking at consequences for humankindthatwill impact in our lifetime, and worse, in the lifetime of our children and generations beyond that." Reviewing recent research, the panel of experts "found firm evidence" that the effects of climate change, coupled with other human-induced impacts such as overfishing and nutrient run-off from farming, have already causeda dramatic decline in ocean health.Not only are there severe declines in many fish species, to the point of commercial extinction in some cases, and an "unparalleled" rate of regional extinction of some habitat types, such as mangrove and seagrass meadows, but some whole marine ecosystems, such as coral reefs, may be gone within a generation.The report says: "Increasing hypoxia [low oxygen levels] and anoxia [absence of oxygen, known as ocean dead zones], combined with warming of the ocean and acidification, are the three factors which have been present in every mass extinction event in Earth's history."There is strong scientific evidence that these three factors are combining in the ocean again, exacerbated by multiple severe stressors. The scientific panel concluded that a new extinction event was inevitable if the current trajectory of damage continues."The panel pointed to a number of indicators showing how serious the situation is. It said, for example, that a single mass coral bleaching event in 1998 killed 16 per cent of all the world's coral reefs, and pointed out that overfishing has reduced some commercial fish stocks and populations of "bycatch" (unintentionally caught) species by more than 90 per cent.

## 1AC --- Plan Text

#### The United States federal government should provide financial incentives for the development and use of offshore Ocean Thermal Energy Conversion technology.

## 1AC --- Solvency

#### Contention \_\_: Solvency

#### Offshore installation most effective- only the federal government has capabilities to solve

Moore 6 [Bill Moore, discussion with Dr. Hans Jurgen Krock, the founder of OCEES on the revival of Ocean Thermal Energy Conversion. April 12, 2006 http://www.evworld.com/article.cfm?storyid=1008]

Although the optimal area for the deployment of OTEC power-islands lies in a 40 degree wide band around the planet's middle, it is, according to Krock, an area equivalent to all the earth's landmass. While onshore installations like the one in Hawaii have their place in providing island communities with power, water, air conditioning and aquaculture, OCEES believes **the real potential is offshore.** The limiting factor for onshore is the size and length of the pipe needed to reach deep, cold water. Offshore production requires relatively short pipes that can be much larger in diameter that drop straight down below the platform.

#### OTEC isn’t being invested in now because of high startup costs

Daniel 2k [Thomas H. Daniel, Ph.D, The Natural energy Laboratory of Hawaii Authority, 1/2000, “Ocean Thermal Energy Conversion (OTEC)” UN Atlas of the Oceans”]

OTEC has tremendous potential to supply the world’s energy . This potential is estimated to be about 1013 watts of baseload power generation [20]. However, OTEC systems must overcome the significant hurdle of high initial capital costs for construction and the perception of significant risk compared to conventional fossil fuel plants. These obstacles can be overcome only by progressing beyond the present experimental testing and evaluation of small-scale demonstration plants to the construction of pilot-sized and, eventually, commerical-sized plants to demonstrate economic feasibility. As a UN Development Program study determined, the confidence to build commercial-sized OTEC plants will not develop until investors have the demonstration of a 5-megawatt pilot plant operating for 5 years. This demonstration will require a significant investment with little potential near-term return. For the near-term future development of OTEC systems, isolated niche markets with high conventional energy costs and a need for energy independence may provide a viable venue for market penetration in the size range of 1 MW to 15 MW. These may provide the demonstration required for penetration into larger markets where economically competitive plants of 50 - 400 MW will be viable

#### Funding key to solve—the financial sector is ready

World Energy Council 8 [World Energy Council, Don Lennard “Survey of Energy Resources 2007: The Way Ahead and the Market” 2008, http://www.worldenergy.org/publications/survey\_of\_energy\_resources\_2007/ocean\_thermal\_energy\_conversion/771.asp]

As with most new technologies, the financial sector is slow to involve itself until one or more representative demonstration plants have operated successfully - and this has proved to be true in the past for OTEC technology. However, with the progressive reduction in risks - for example the mooring of a floating OTEC plant will now be an application of 'routine' offshore oil and gas experience - a number of more enlightened financial bodies are now prepared to become involved at this relatively early stage of development. Other funding sources would include agencies such as the World Bank or European Development Bank and a further potential source of funding is possible through the Lomé and Cotonou Agreements between the European Union and the Africa-Caribbean-Pacific (ACP) States, many of which are prime candidates to use OTEC power. In Europe both the European Commission and the industrially-based Maritime Industries Forum examined OTEC opportunities with relevance to DOWA in general rather than just OTEC, and the UK published its Foresight document for the marine sector, looking five to twenty years ahead, and both OTEC and DOWA were included in the energy section of the paper. It is significant that the emphasis in the recommendations from all three European groupings has, again, been on the funding and construction of a plant in the 5-10 MW range. Current US activity is concentrating on an Indian Ocean island site, and it is perhaps noteworthy that both Japanese and British evaluations continue to identify Fijian prime sites, one each on the two largest islands of that country. The worldwide market for all renewables has been estimated for the timescales from 1990 to 2020 and 2050, with three scenarios and, not surprisingly, all show significant growth. Within those total renewable figures, opportunities exist for the construction of a significant amount of OTEC capacity, even though OTEC may account for only a small percentage of total global electricity generating capacity for some years.  Estimates have been made by French, Japanese, British and American workers in the field, suggesting worldwide installed power for up to a thousand OTEC plants by the year 2010, of which 50% would be no larger than 10 MW, and less than 10% would be of 100 MW size. On longer timescales, the demand for OTEC in the Asia/Pacific region has been estimated at 20 GW in 2020 and 100 GW in 2050 (OECD, 1999). It has to be said that some of these numbers seem optimistic, with realisation depending on the successful operation of a number of demonstrator plants at an early date. In summary, however, it can realistically be claimed that the economic commercialisation of OTEC/DOWA is 'now' - nearly all the technology is established, and the greatest concentration of effort seems logically to be aimed at lining up an increased range of suitable funding sources.

#### Plan sets the US as a leader in OTEC developed – Gets modeled globally

Moore 2006 [Bill, citing Dr. Hans Krock, founder of OCEES, April 12, "OTEC Resurfaces", http://www.evworld.com/article.cfm?storyid=1008]

"The United States is the best placed of any country in the world to do this," he contends. "The United States is the only country in the world of any size whose budget for its navy is bigger than the budget for its army." ¶ It's his contention that this will enable America to assume a leadership position in OTEC technology, allowing it to deploy plants in the Atlantic, Caribbean and Pacific, but he offers a warming.¶ "If we are stupid enough not to take advantage of this, well then this will be China's century and not the American century."¶ Krock is currently negotiating with the U.S. Navy to deploy first working OTEC plant offshore of a British-controlled island in the Indian Ocean -- most likely Diego Garcia though he wouldn't confirm this for security purposes.¶ He is also working with firms in Britain and Netherlands and will be headed to China for talks with the government in Beijing.¶ "The Chinese know very well that they cannot build there futures on oil," he stated, noting that China's is investing large sums of money in a blue water navy. "The United States will be playing catch-up in this technology. We're here. We're willing to do it. We're doing it with the Navy." He expects to put his first plant to sea sometime in 2008 after constructing it, mostly likely, in Singapore.¶ "We simply have to look at the all the alternatives [to conventional fossil fuels and nuclear power] and this is, hands down, the only alternative that's big enough to replace oil."

# Desalination Advantage

### OTEC Key

#### Specifically OTEC development allows for mass production of freshwater and other minerals and industries

Cross 2013 [Martin, Translator, former chef and marketeer, currently disabled. I write articles on food,, travel, politics, religion and technology. How an ocean thermal energy conversion (OTEC) plant works <https://suite.io/martin-cross/67sw266>

In an open-cycle OTEC plant, the warm surface water is used directly to make electricity. Surface seawater is forced to vaporize in a near vacuum created in a special pressure vessel. The vapour (steam) drives a low-pressure turbine generator to produce electricity in the same way as a closed-cycle OTEC plant. This steam is then condensed back into pure fresh water by passing the steam through an exchanger fed with cold water from the ocean deeps or by pumping it down into deep cold water before returning it to the surface. The salt and any other contaminants in the seawater are left in the pressure vessel, from which they can be extracted at regular intervals. The advantages of this type of cycle are that several benefits for the local community can be obtained from a single plant. Many tropical islands, such as the Cape Verde Islands, suffer from a lack of freshwater. An open-cycle plant would provide both power and freshwater, plus the sea salt, which in itself is a marketable commodity or which can be mined for minerals before sale as salt. The pure water generated is suitable for domestic purposes and irrigation as well as industrial processes such as electrolysis into oxygen and hydrogen for fuel cells to power a hydrogen economy. In Hawaii, the National Renewable Energy Laboratory, as it is now known, has developed a vertical-spout evaporator for converting warm seawater into steam for use in this type of plant. This significantly increases the efficiency of the water to steam conversion

#### OTEC creates plenty of water

(OTEC) 2013 [Ocean Thermal Energy Corporation Welcome to Ocean Thermal Energy: An Introduction <http://www.environmental-expert.com/companies/ocean-thermal-energy-corporation-otec-42134>

Fresh Water Production

The associated production of large quantities of fresh water is one of the great attendant benefits of both Ocean Thermal Energy Conversion (OTEC) plants and Seawater Air Conditioning (SWAC) facilities. An OTEC plant can produce up to 800,000 gallons per day of fresh water per Megawatt (MW) of installed gross electric power capacity. Thus, a 5MW OTEC facility could potentially produce as much as 4 million gallons of fresh drinking water each day. Fresh water production in conjunction with OTEC and SWAC systems is also environmentally superior to traditional water production methods utilizing local surface water sources to feed the desalination units. This environmental advantage arises from the more efficient multi-use of the source water, as well as the extreme dilution of brine (water containing large amounts of salt), thus rendering such brine discharge concentrations nearly undetectable and harmless to the environment. With the world’s demand for fresh water growing rapidly, the economic opportunities and humanitarian benefits of this technology are substantial. Ocean Thermal Energy Corporation stands ready to meet that growing demand.

#### OTEC prevents stoppages in energy unlike other renewable resources

Oak Ridge National Library 2009 [ORNL is a national multi-program research and development facility managed by UT-Battelle for the U.S. Department of Energy Power from the Sea <http://web.ornl.gov/info/ornlreview/v44_3_11/article09.shtml>

"There are several compelling advantages to the system," says Klett. "First, it produces totally green energy; there are no by-products. It's also very much like geothermal, solar or wind power in that it does not take any fossil fuel to drive it, so costs are limited to construction and maintenance." In addition, Klett is particularly emphatic about the availability of OTEC power. He notes that consumers don't always understand that the only kind of "green" energy that is currently available as "base power"—power that is available 24 hours a day, 7 days a week—is geothermal. "With other renewables," he says, "when the wind stops, you don't have power. If it's a cloudy day, you don't have power. Even hydroelectric power is at the mercy of fluctuating water levels. OTEC can actually be used for base power." Estimates suggest that, in tropical latitudes, OTEC has the potential to generate 3 to 5 terawatts of power without affecting the temperature of the ocean or the world's environment. "That's more than the electric generating capacity of this country," he says. "If we can supply a large fraction of our base power needs with green energy, we can revolutionize power generation."

### OTEC works for India

#### OTEC has the needed qualities to be developed and used in India

Sharma & Sharma 2013 [R.C. Sharma Department of Applied Sciences and Humanities, Dronacharya College of Engineering, Khentawas, G urgaon . 1 and Niharika Sharma PGT, Meenakshi World School Gurgaon Energy from the Ocean and Scope of its Utilization in India http://www.ripublication.com/ijeem\_spl/ijeemv4n4\_17.pdf

Ocean Thermal Energy Conversion (OTEC) extracts solar energy through a heat engine operating across the temperature differenc e between warm surface water and cold deep water. In the tropics, surface waters are above 80 o F, but at ocean depths of about 1,000 meters, water temperatures are just above freezing everywhere in the ocean. This provides a 45 to 50 o F temperature differen tial that can be used to extract energy from the surface waters[10]. The most optimistic expectations for OTEC predict a cost on the order of ten times greater than for conventional fossil sources. If OTEC can ever be made cost effective, India is ideally situated to use it, with its large length of coastline adjacent to the deep off - shore water of the Indian ocean The India OTEC program started in 1980 to install a 20 MW plant off the Tami Nadu coast and in 1982, an OTEC cell was formed in National Institute of Ocean Technology (NIOT). A preliminary design was also completed in 1984 for a 1 MW closed Rankine cycle floating plant with ammonia as working flui d. In 1997, Government of India proposed to establish a 1 MW gross OTEC plant. To develop this project, India researchers have been exploring the participation of international expertise for a joint research and development. Based on the temperature and ba thymetric profiles, the optimization of the closed loop system was done with the help of Saga University in 1998

### OTEC Solves Desal

#### OTEC has specific developments to ensure that the tech will work in the desalination plants

Kumar et al 2012 [S V S Phani, M V Ramana Murthy, Purnima Jalihal, M A Atmanand Tapping the Oceans

for Energy http://re.indiaenvironmentportal.org.in/files/file/oceans%20for%20energy.pdf

However due to lack of suitable infrastructure and handling equipment, there were failures in the cold water pipe deployment. It was therefore decided to attempt desalination using the temperature gradient at shallower waters less than 500 m using the Low Temperature Thermal Desalination (LTTD) method. The process deals with evaporating the warmer surface sea water at low pressures and condensing the resultant pure vapour using deep sea cold water available at about 400m below sea level. The process is found to be simple and easy to maintain since t requires just a few components such as a flash chamber for evaporation, a condenser for liquefying the vapour, sea water pumps, vacuum system, a long pipe to draw cold water from 400m below sea level, marine structures such as sump, plant building and the bridge. The use of LTTD with ocean thermal gradient also results in an environmentally friendly technology because of its use of naturally available heat in the process. A schematic diagram of LTTD process is shown in Fig. 4. A pilot desalination plant with a capacity of 100m 3 /day was established in the Kavaratti Island of Lakshadweep. The NIOT maintained the plant for one year and handed it over to the local PWD in 2006, which continues to maintain the plant till date. The NIOT put up similar plants in the region and two more plants, in Agatti and Minicoy Islands, each with a capacity of 100 cu m/day that started operations in 2011

### Desaliniation k2 Water

**Desalination plants solve tech and other distribution concerns**

Habibi et al, 1/2/2013 [Azita, Rodrigo Sabato & Pia Schafer, members of Lauder Class of 2014 Water Scarcity: A Daunting Challenge with a Hopeful Future http://knowledge.wharton.upenn.edu/article.cfm?articleid=3164

The problem of uneven distribution becomes obvious when we compare countries rich in water sources (such as Colombia and Canada) to areas suffering from severe scarcity (such as North Africa and the Middle East). According to the UN, approximately 1.2 billion people (or nearly a fifth of the world's population) live in areas of physical scarcity, and another 500 million are approaching this situation. Projections show that, by 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world's population could be living under water-stressed conditions.¶ The problem of water being wasted, polluted or managed unsustainably has become a serious issue in the last century, as water use has been growing at more than twice the rate of the increase in population. The UN estimates that water production lost due to leakage, theft and inadequate billing practices ranges from 10% to 30% in developed nations and from 40% to 50% in developing countries. By 2050, untreated wastewater could contaminate a third of global annual renewable freshwater supplies. Including those who currently do not live in areas of physical scarcity, 1.6 billion people face economic water shortages, where countries lack the necessary infrastructure to make water from rivers and aquifers accessible. At the same time, agriculture alone utilizes 15% to 35% of its water in excess of sustainable limits.¶ According to Jiménez, agriculture illustrates the classic case of water mismanagement, where potable water is often used for purposes that could be served by other types of "reutilized" water, preserving the premium water for more vital purposes (i.e., for drinking or personal hygiene). This problem extends beyond agriculture, given that many parts of the world use the same premium, potable water from the faucet to flush toilets.¶ Finally, there is also a growing need for investment in infrastructure to deliver water to the end users and to transport wastewater back to treatment plants. The vast network of pipes in developed countries is deteriorating quickly and is in urgent need of repair. The situation is even worse in the developing world, where basic infrastructure is still lacking, particularly for wastewater treatment. In many parts of the world, poor urban residents still buy water from trucks because there is no piped tap water for their homes. Jiménez stated that people often do not realize how costly it is to bring water to their taps and that the prices they pay in water tariffs do not reflect the full costs associated with the processes.¶ Water scarcity is a complex and challenging problem, especially in light of ever-increasing global demands. Jiménez, however, pointed to the continuous investment in searching for new sources of water, such as desalination technologies, as one of the few foreseeable solutions.

### AT Desal not Economical

#### Water Desalination plants work- they lower costs and can reduce shortages

Habibi et al, 1/2/2013 [Azita, Rodrigo Sabato & Pia Schafer, members of Lauder Class of 2014 Water Scarcity: A Daunting Challenge with a Hopeful Future http://knowledge.wharton.upenn.edu/article.cfm?articleid=3164

The substantial investments in desalination and wastewater-treatment technologies, and the osmosis membranes that followed, have lowered the fixed and variable costs of water generation over time. Thus, these technologies are employed widely today and have the potential to mitigate future water shortages. According to research estimates, by 2025, desalination will account for 11.5% of water generation compared with an installed capacity of only 1% in 2007. This will require important infrastructure investment projects, both public and private, as reflected in the Millennium Development Goals (MDG), which foresee US$280 billion in public-water infrastructure spending.¶ Private water-service providers, such as the Spanish infrastructure companies or France's Veolia and Suez, project annual spending of approximately US$37 billion in Asia, US$25 billion in Europe (both up from US$15 billion in 2010) and US$18 billion in the rest of the world (up from US$7 billion) by 2016. Spanish infrastructure companies are well placed to take advantage of these developments.

### Indo/Pak War- Extinction

#### Best new studies prove this would cause extinction

Starr 11 (Consequences of a Single Failure of Nuclear Deterrence by Steven Starr February 07, 2011 \* Associate member of the Nuclear Age Peace Foundation \* Senior Scientist for PSR

**Only a single failure of nuclear deterrence is required to start a nuclear war, and the consequences of such a failure would be profound. Peer-reviewed studies predict that less than 1% of the nuclear weapons now deployed in the arsenals of the Nuclear Weapon States, if detonated in urban areas, would immediately kill tens of millions of people, and cause long-term, catastrophic disruptions of the global climate and massive destruction of Earth’s protective ozone layer.** The result would be a global nuclear famine that could kill up to one billion people. A full-scale war, fought with the strategic nuclear arsenals of the United States and Russia, would so utterly devastate Earth’s environment that most humans and other complex forms of life would not survive. Yet no Nuclear Weapon State has ever evaluated the environmental, ecological or agricultural consequences of the detonation of its nuclear arsenals in conflict. Military and political leaders in these nations thus remain dangerously unaware of the existential danger which their weapons present to the entire human race. Consequently, nuclear weapons remain as the cornerstone of the military arsenals in the Nuclear Weapon States, where nuclear deterrence guides political and military strategy. Those who actively support nuclear deterrence are trained to believe that deterrence cannot fail, so long as their doctrines are observed, and their weapons systems are maintained and continuously modernized. They insist that their nuclear forces will remain forever under their complete control, immune from cyberwarfare, sabotage, terrorism, human or technical error. They deny that the short 12-to-30 minute flight times of nuclear missiles would not leave a President enough time to make rational decisions following a tactical, electronic warning of nuclear attack. The U.S. and Russia continue to keep a total of 2000 strategic nuclear weapons at launch-ready status – ready to launch with only a few minutes warning. Yet both nations are remarkably unable to acknowledge that this high-alert status in any way increases the probability that these weapons will someday be used in conflict. How can strategic nuclear arsenals truly be “safe” from accidental or unauthorized use, when they can be launched literally at a moment’s notice? A cocked and loaded weapon is infinitely easier to fire than one which is unloaded and stored in a locked safe. The mere existence of immense nuclear arsenals, in whatever status they are maintained, makes possible their eventual use in a nuclear war**. Our best scientists now tell us that such a war would mean the end of human history.** We need to ask our leaders: Exactly what political or national goals could possibly justify risking **a nuclear war that would** likely **cause the extinction of the human race**? However, in order to pose this question, we must first make the fact known that existing nuclear **arsenals – through their capacity to utterly devastate the Earth’s environment and ecosystems – threaten** continued human **existence**. Otherwise, military and political leaders will continue to cling to their nuclear arsenals and will remain both unwilling and unable to discuss the real consequences of failure of deterrence. We can and must end the silence, and awaken the peoples of all nations to the realization that “nuclear war” means “global nuclear suicide”. **A Single Failure o**f Nuclear **Deterrence could lead to: \* A nuclear war between India and Pakistan;** \* 50 Hiroshima-size (15 kiloton) weapons detonated in the mega-cities of both India and Pakistan (there are now 130-190 operational nuclear weapons which exist in the combined arsenals of these nations); \* The deaths of 20 to 50 million people as a result of the prompt effects of these nuclear detonations (blast, fire and radioactive fallout); \* Massive firestorms covering many hundreds of square miles/kilometers (created by nuclear detonations that produce temperatures hotter than those believed to exist at the center of the sun), that would engulf these cities and produce 6 to 7 million tons of thick, black smoke; \* About 5 million tons of smoke that would quickly rise above cloud level into the stratosphere, where strong winds would carry it around the Earth in 10 days; \* **A stratospheric smoke layer surrounding** the **Earth,** which would remain in place **for 10** years; \* The dense **smoke** **would** heat the upper atmosphere, **destroy Earth’s protective ozone** layer, and block 7-10% of warming sunlight from reaching Earth’s surface; \* 25% to 40% of the protective ozone layer would be destroyed at the mid-latitudes, and 50-70% would be destroyed at northern and southern high latitudes; \* Ozone destruction would cause the average UV Index to increase to 16-22 in the U.S, Europe, Eurasia and China, with even higher readings towards the poles (readings of 11 or higher are classified as “extreme” by the U.S. EPA). It would take 7-8 minutes for a fair skinned person to receive a painful sunburn at mid-day; \* Loss of warming sunlight would quickly produce average surface temperatures in the Northern Hemisphere colder than any experienced in the last 1000 years; \* Hemispheric drops in temperature would be about twice as large and last ten times longer then those which followed the largest volcanic eruption in the last 500 years, Mt. Tambora in 1816. The following year, 1817, was called “The Year Without Summer”, which saw famine in Europe from massive crop failures; \* Growing seasons in the Northern Hemisphere would be significantly shortened. It would be too cold to grow wheat in most of Canada for at least several years; \* World grain stocks, which already are at historically low levels, would be completely depleted; grain exporting nations would likely cease exports in order to meet their own food needs; \* The **one billion** already **hungry people**, who currently depend upon grain imports, **would** likely **starve to death** in the years following this nuclear war; \* The total explosive power in these 100 Hiroshima-size weapons is less than 1% of the total explosive power contained in the currently operational and deployed U.S. and Russian nuclear forces.

### Indo/Pak War- Water key

#### Water is the greatest issue between the two areas

Husain 2011, Shahid is a special correspondent for Pakistan's national English daily The News. He is also Pakistan bureau chief for The Sunday Indian Water shortages threaten renewed conflict between Pakistan, India http://www.trust.org/item/?map=water-shortages-threaten-renewed-conflict-between-pakistan-india/

KARACHI, Pakistan (AlertNet) – As population growth and climate change increase competition for water around the world, India and Pakistan may find water a growing source of conflict, analysts say. The two South Asian countries have a long history of tensions over issues as diverse as terrorist attacks and rights to Kashmir. Diplomatic initiatives have helped reduced these tensions in recent years. But given that India and Pakistan share numerous rivers, some experts think that the issue of water supplies could lead to renewed conflict, making water conservation an even more urgent priority. Water is clearly in increasingly short supply in India and Pakistan. Per capita water availability in Pakistan has fallen by nearly 75 percent over the last 60 years, in part because of rapid population growth. The country is seen as having too few dams and reservoirs to hold water supplies, and agricultural production is threatened by a lack of water. Nasim A. Khan, an academic and former secretary of Pakistan’s Alternative Energy Development Board, sees the territorial dispute between Pakistan and India over Kashmir as in part a fight for water resources, and is concerned by India’s construction of dams in the part of the territory that it controls. “The roots of the Jhelum, Chenab and Indus (rivers) are in Kashmir, and any foul play can create tremendous differences,” Khan said, referring to India’s construction of dams on these rivers over the past two decades. DRYING RIVERS Khan maintains India has depleted water supplies from two rivers, the Ravi and Sutlej, which have their sources in India but flow into north-east Pakistan, as well as from the Beas, an Indian tributary of the Sutlej. “The Sutlej and Beas are already dry, and the Ravi is partially dry. All water is being stopped in India,” Khan said. The Indus Water Treaty, signed by Pakistan and India in 1960, reserves the waters of the Jhelum, Chenab and Indus for Pakistan, while the Ravi and Sutlej are reserved for India India’s dam building in Kashmir, however, has raised suspicions in Pakistan that it is taking an unfair share of the waters of the Jhelum, Chenab and Indus, Khan said. “India continues to violate this treaty by consuming more water and building dams. Pakistan has raised this concern with the World Bank,” he said. Indian officials maintain they are operating within the boundaries of the Indus Water Treaty, though the treaty is widely viewed within Pakistan as favouring India. World Bank mediation of one dispute over dam building was decided in 2007 in India’s favour. Pakistan is constructing several dams of its own on rivers in the area of Kashmir that it controls, as well as in the country’s northern province of Khyber Pakhtunkhwa province. Paul Brown, a British journalist who has written books on climate issues, says the governments of countries such as India and Pakistan need to keep water from becoming one more weapon in their geopolitical rivalries. “They need to regard water as a precious resource and a human right that has to be shared between nations,” Brown said. In part, this is to set a good example to the people most affected by potential water shortages. “If supplies run low for irrigation or drinking water, local populations are likely to take the law into their own hands and grab what water is available. This could lead to serious local tensions getting out of control," Brown said. CONSERVATION, TECHNOLOGY Brown believes that water conservation, especially through more efficient irrigation and treatment of waste water, can help relieve the pressure on supplies. Khan sees the provinces of Punjab, Sindh and Balochistan as particularly vulnerable to water shortages, compared to the northern parts of the country. Pakistan’s Indus River System Authority is tasked with addressing questions of water apportionment between provinces. Alongside political mediation, Khan also sees hope in technological advances. “Pakistan must strive to develop low-cost reverse osmosis technology to convert sub-surface brackish water into potable water. And for the lower part of Sindh and the coastal belt of Balochistan, seawater reverse osmosis can reduce conflict” over water resources, Khan said. Haris Gazdar, a development economist in Pakistan who works for the Collective for Social Sciences, a Karachi-based independent think tank, holds out hope that conflict over water supplies can be avoided if conservation efforts are stepped up. "In theory there is no reason why more water cannot be made available. (But) conservation and management require not only investment but changes in social and political organization and technology,” he said.

#### Water is the issue that will trigger war in the region

Pagett 2013 [Norman, professional writer and communicator, producing specialist technical material for a range of users in the engineering building transport environmental health and food industries. Water conflict between India and Pakistan? http://www.endofmore.com/?p=1158

Pakistan is one of the most water stressed countries in the world. That’s serious enough, but that seemingly simple statement hides the real problem. The population right now is 190 million, with a growth rate that will double that number in about 50 years or so. It won’t get anywhere near 400 million of course, Long before then Pakistan will have descended into chaos, warfare and the kind of oblivion that will take its neighbours down with it.. Pakistan shares its ultimate water source, the Himalaya, with India, which has an even bigger population problem, both are facing the certainty of climate change, (whether they deny it or not) which is going to reduce that supply to every nation dependent on it. Both are nuclear armed and facing the kind of chaos that only food and water shortage can bring, and neither will accept that their problems are the result of too many people chasing diminishing resources with a rapidly depleting energy supply. Instead there is the mindless insistence that it is a political problem. Just like everywhere else. Riots, demonstrations, political anarchy isn’t going to alter this reality, but it will cement denial of it as each faction battles for its share of a dwindling resource and offers solutions based around religious, military or political dogma, or a lethal combination of all three. The riots happening right now are driving this fact home, as residents in Abbottabad demand that government rectify their water shortage problems. But water has to be used at an ever increasing rate in an attempt to satisfy people, power supplies, industry, and farming with increasingly frantic desperation. 18 hour power outages are commonplace while politicians trying to run this farcical situation know that however they divert water, it’s always going to leave an agitated group screaming for more of it. But there is no more. “No More’ is what the world itself is screaming. Pakistan is just part of a visible reality of that fact. The same brutal truth can be transferred to any continent to a greater or lesser degree. Every facet of our civilisation is demanding too much. Our exploding population is draining everything on a world scale, while economists and politicians offer reassurance that there will always be more no matter how much we demand. And just like the people of Pakistan, we vote for the most convincing liars who assure us that infinite growth and plenty can be ours in some mythical future. Every politician promises growth. Nothing else is acceptable in political terms. Pakistan right now is desperation becoming reality for a thirsty people, too many demanding too much of a commodity that is no longer available. Dams and power stations have been built, this improved food supplies in the past, this in turn grew the population who demanded more food, more energy more water until water reserves are now down to 30 days supply, a pitiful amount compared to the 1000 days reserves that countries with similar climates should have. This puts Pakistan at the critical level for water supply, reflected in the repeated and violent protests. When the original water treaties were established in the 60s, nobody bothered to do any simple compound interest calculations about population growth, everyone deluded themselves that population growth was a ‘good thing’ and that somehow increasing numbers could always be absorbed. Now the point has been reached where numbers cannot be fed and watered adequately and everyone is in denial over it. So we have the spectre of religion, politics and an unstable military each seeking to consolidate its position and blame others for the predicament they now find themselves in. But still the insistence that it is a political problem remains deeply ingrained, Hafiz Saeed the founder of the militant group, Lakshar-e-Taiba — the organization behind the 2008 Mumbai attacks — has unequivocally blamed India for Pakistan’s water crunch, accusing its government of committing “water terrorism.” True to form, he points a finger elsewhere to evoke an issue that is sensitive to millions of Pakistanis. Saeed’s rhetoric demonstrates the potential of militant groups to exploit this issue. As resource shortage forces Pakistan to disintegrate into political and religious chaos and warring factions, we mustn’t lose sight of the fact that Pakistan is nuclear armed, as is India. Throughout history nations faced with imminent chaos invariably find an excuse to declare war on their neighbours to divert their own people away from domestic reality. The prospect of running out of water provides the ultimate excuse for war.

### Water Scarcity Impact- Extinction

#### Global water scarcity is the flashpoint for conflict

Priyadarshi 12[Nitish lecturer in the department of environment and water management at Ranchi University in India, “War for water is not a far cry”, June 16, <http://www.cleangangaportal.org/node/44>

The battles of yesterday were fought over land. Those of today are over energy. But the battles of tomorrow may be over water. Along with population growth and increasing per capita water consumption, massive pollution of the world's surface water systems has placed a great strain on remaining supplies of clean fresh water. Global deforestation, destruction of wetlands, dumping of pesticides and fertilizer into waterways, and global warming are all taking a terrible toll on the Earth's fragile water system. The combination of increasing demand and shrinking supply has attracted the interest of global corporations who want to sell water for a profit. The water industry is touted by the World Bank as a potential trillion-dollar industry. Water has become the “blue gold” of the 21st century. In many parts of the world, one major river supplies water to multiple countries. Climate change, pollution and population growth are putting a significant strain on supplies. In some areas renewable water reserves are in danger of dropping below the 500 cubic meters per person per year considered a minimum for a functioning society. In recent times, several studies around the globe show that climatic change is likely to impact significantly upon freshwater resources availability. In India, demand for water has already increased manifold over the years due to urbanization, agriculture expansion, increasing population, rapid industrialization and economic development. At present, changes in cropping pattern and land-use pattern, over-exploitation of water storage and changes in irrigation and drainage are modifying the hydrological cycle in many climate regions and river basins of India. Due to warming and climate change rainfall trend has been badly affected worldwide. This change has adversely affected the groundwater recharge. Water scarcity is expected to become an even more important problem than it is today. In a case study of Jharkhand state of India groundwater recharging is mainly dependent on rainfall. Though Jharkhand receives sufficient amount of rainfall (900 to 1400 mm/year) but from last several years the rainfall pattern is very erratic. From last two years Ranchi city the capital of Jharkhand state received sufficient rainfall but distribution of rainfall was not uniform. It rained heavily just for two to three days in the month of August and September which resulted in heavy runoff and less infiltration affecting groundwater level. The process of urbanization and industrialization from last 20 years has caused changes in the water table of Jharkhand State of India as a result of decreased recharge and increased withdrawal. Many of the small ponds which were main source of water in the surrounding areas are now filled for different construction purpose affecting the water table. By 2100, water scarcity could impact between 1.1 and 3.2 billion people, says a leaked draft of an Intergovernmental Panel on Climate Change (IPCC) report due to be published in April 2007. The report focuses on the consequences of global warming and options for adapting to them. In February 2007 the panel released a report on the scientific basis of climate change. The IPCC predicts critical water shortages in China and Australia, as well as parts of Europe and the United States. Africa and poor countries such as Bangladesh would be most affected because they were least able to cope with drought. Major cities worldwide may face a water shortage crisis by 2050 if relevant governments don't react quickly. The water shortage will mostly affect basic daily needs such as drinking, cooking, bathing and washing clothes, and the poor residents of the world's major cities in developing countries are the ones who will suffer most. "By 2050, big cities that will not have enough water available nearby include Beijing, New Delhi, Mexico City, Lagos and Tehran. China and India will be particularly hard hit unless significant new efforts are taken by their cities,". There are several principal manifestations of the water crisis. 1. Inadequate access to safe drinking water for about 884 million people. 2. Inadequate access to water for sanitation and waste disposal for 2.5 billion people. 3. Groundwater over drafting (excessive use) leading to diminished agricultural yields. 4. Overuse and pollution of water resources harming biodiversity. 5. Regional conflicts over scarce water resources sometimes resulting in warfare. Potential Hot Spots: Egypt: A coalition led by Ethiopia is challenging old agreements that allow Egypt to use more than 50 percent of the Nile’s flow. Without the river, all of Egypt would be desert. Eastern Europe: Decades of pollution have fouled the Danube, leaving down-stream countries, such as Hungary and the Republic of Moldova, scrambling to find new sources of water. Middle East: The Jordan River, racked by drought and diverted by Israeli, Syrian and the Jordanian dams, has lost 95 percent of its former flow. Former Soviet Union: The Aral sea, at one time the world’s fourth largest inland sea, has lost 75 percent of its water because of diversion programs begun in the 1960s. There are many other countries of the world that are severely impacted with regard to human health and inadequate drinking water. The following is a partial list of some of the countries with significant populations (numerical population of affected population listed) whose only consumption is of contaminated water:  Sudan: 12.3 million  Venezuela: 5.0 million  Ethiopia: 2.7 million  Tunisia: 2.1 million  Cuba :1.3 million

Extinction

**Voinov and Cardwell 9**—Alexey is Fellow @ Institute for Water Resources, US Army Corps of Engineers. Hal Cardwell , International Institute for Geo-information Science and Earth Observation (ITC). “The Energy-Water Nexus: Why Should We Care?” Journal of Contemporary Water Research & Education, Issue 143, pages 17-29, December 2009. <http://www.uvm.edu/giee/publications/Voinov_Energy_2009.pdf>

Water and energy are essential for human livelihood and the large-scale capture and use of these resources have brought many economic, social, and health benefits to humans across the globe. Both energy and water belong to the so-called critical natural capital category, which means that they are essential for human survival. As supply becomes scarce, they exhibit high price inelasticity of demand, so that a small reduction of supply leads to a huge increase in price. As a result the total value (price x quantity) rapidly increases as total quantity declines (Farley and Gaddis 2007). This is true for any resource that is essential and non-substitutable. As there is less water or energy available, their price quickly increases towards infinity. This can create havoc in markets and stress the whole economic system, as during the energy crisis of the 1970’s. Diminished water supplies may lead to direct conflict and violence. When energy and water supplies are abundant, their value is low. It may seem that we have an infinite supply and there is no need to worry. However, as we approach depletion, even small perturbations due to unforeseen climatic events, sharp increases in demand or technical malfunction results in disproportionate changes in their values and prices, if the market is allowed to work

**Extinction**

NASCA 4 (National Association for Scientific and Cultural Appreciation, "Water Shortages – Only a Matter of Time", http://www.nasca.org.uk/Strange\_relics\_/water/water.html)

Water shortage.It’s just around the corner. Water is one of the prime essentials for life as we know it. The plain fact is - no water, no life! This becomes all the more worrying when we realise that the worlds supply of drinkable water will soon diminish quite rapidly. In fact a recent report commissioned by the United Nations has emphasised that by the year 2025 at least 66% of the worlds population will be without an adequate water supply. Incalculable damage. As a disaster in the making water shortage ranks in the top category. Without water we are finished, and it is thus imperative that we protect the mechanism through which we derive our supply of this life giving fluid. Unfortunately the exact opposite is the case. We are doing incalculable damage to the planets capacity to generate water and this will have far ranging consequences for the not too distant future. Bleak future The United Nations has warned that burning of fossil fuels is the prime cause of water shortage. While there may be other reasons such as increased solar activity it is clear that this is a situation over which we can exert a great deal of control. If not then the future will be very bleak indeed! Already the warning signs are there. Drought conditions. The last year has seen devastating heatwaves in many parts of the world including the USA where the state of Texas experienced its worst drought on record. Elsewhere in the United States forest fires raged out of control, while other regions of the globe experienced drought conditions that were even more severe. Parts of Iran, Afgahnistan, China and other neighbouring countries experienced their worst droughts on record. These conditions also extended throughout many parts of Africa and it is clear that if circumstances remain unchanged we are facing a disaster of epic proportions. Moreover it will be one for which there is no easy answer.

### Water Scarcity Impact- Water Wars

#### Solves Nuclear War from water wars

**Weiner 90** (Jonathan, Pulitzer Prize winning author, “The Next One Hundred Years”, p. 270)

If we do not destroy ourselves with the A-bomb and the H-bomb, then we may destroy ourselves with the C-bomb, the Change Bomb. And in a world as interlinked as ours, one explosion may lead to the other. Already in the Middle East, from North Africa to the Persian Gulf and from the Nile to the Euphrates, tensions over dwindling water supplies and rising populations are reaching what many experts describe as a flashpoint. A climate shift in that single battle-scarred nexus might trigger international tensions that will unleash some of the 60,000 nuclear warheads the world has stockpiled since Trinity.

### Water Scarcity Impact- Middle East Escalation

**Specifically- Water scarcity increases the risk of conflict in the Middle East**

Deen, 1/16/2013 [Thalif, Interpress Service News Agency, Digging for Water, But Striking Oil http://www.ipsnews.net/2013/01/digging-for-water-but-striking-oil/

ABU DHABI, Jan 16 2013 (IPS) - The volatile politics of the Middle East have long been dominated by the fluctuating fortunes of a single commodity: oil.¶ But when the oil-blessed region runs out of water, there could be a change in the political landscape, triggering potential conflicts. The world’s future wars, experts predict, will be over water, not oil.¶ U.N. Secretary-General Ban Ki-moon warned last year that water shortages contribute not only to poverty but also cause social hardships and impede development.¶ More importantly, he warned “they create tensions in conflict-prone regions” (Read: Middle East). “And too often, where we need water, we find guns.” (Read: Gulf nations, whose arms purchases, mostly funded by oil earnings, keep skyrocketing). The lingering economic paradox was perhaps best described by an unnamed Kuwaiti official who once remarked, “Whenever we dig for water, we strike oil.”¶ At the first International Water Summit (IWS) in Abu Dhabi Wednesday, over 30,000 participants, including political and business leaders, met to formulate a strategy to underscore the importance of water for the political and economic stability of the region.¶ As Crown Prince, General Sheikh Mohammed bi Zayed Al Nahyan said Tuesday: “For the United Arab Emirates (UAE), water is (now) more important than oil.”¶ Munqeth Meyhar, chairman/Eco Peace, at Friends of the Earth Middle East (FoEME), told IPS the region has experienced many environmental concerns lately, including climate change. Water resources are becoming increasingly scarce, especially for the millions there who already lack access to fresh water.¶ He pointed out that some of these countries, including Yemen, Saudi Arabia, and Iraq, are facing unique problems that require immediate attention.¶ “One shared factor of all the countries in the Middle East is their lack of water resources and poor water management,” said Meyhar, who closely monitors the growing water crisis in the region.¶ The Middle East has some of the world’s largest oil reserves, which produces most of the area’s wealth. Even so, the region’s climate and environment make living harsh, he said.¶ The Middle East requires water resources and suitable land for agriculture. But much of the land available for producing food is destroyed by increasing desertification.¶ Desertification is a sweeping environmental problem, with vast effects in countries such as Syria, Jordan, and Iraq, said Meyhar.¶ Universal causes for a spread of arid environment are unsustainable agriculture practices and overgrazing. Agriculture uses 70 percent of water in this region.¶ It is common to misuse land by heavy irrigation in the Middle East. Droughts are more frequent, and contribute to the changing landscape, he noted.¶ The overuse of water in agriculture is affecting the countries’ already undersized water resources.¶ As the world faces possible water scarcities in the next two to three decades, the U.S. intelligence community has portrayed a grim scenario for the foreseeable future: ethnic conflicts, regional tensions, political instability and even mass killings. During the next 10 years, “many countries important to the United States will almost certainly experience water problems – shortages, poor water quality, or floods – that will contribute to the risk of instability and state failure, and increased regional tensions,” stated a National Intelligence Estimate released in March 2011.¶ And in July of the same year, Chris Kojm, chairman of the National Intelligence Council, predicted that by 2030, nearly half of the world’s population – currently at more than seven billion – will live in areas of severe water stress, increasing the likelihood of mass killings.¶ Meyhar of the Friends of the Earth Middle East said the mostly arid Jordan, endures severe water scarcity.¶ The cost of water in Jordan increased 30 percent in 10 years, due to a shortage of groundwater, he said. And in recent years, Jordan has not been able to produce enough food to sustain its populations.¶ Meyhar said water scarcity has damaged the standard of living for inhabitants of the countryside, causing a big flux of movement towards major cities. This is a problem facing all Middle Eastern countries.

#### Water scarcity causes Middle East war

Nitish Priyadarshi 12, lecturer in the department of environment and water management at Ranchi University in India, “War for water is not a far cry”, June 16, <http://www.cleangangaportal.org/node/44>

The crisis over water in the Middle East is escalating. Despite existing agreements, dwindling resources – increasingly affected by pollution, agricultural/industrial initiatives and population growth – have elevated the strategic importance of water in the region. For Middle Eastern nations, many already treading the razor’s edge of conflict, water is becoming a catalyst for confrontation – an issue of national security and foreign policy as well as domestic stability. Given water’s growing ability to redefine interstate relations, the success of future efforts to address water sharing and distribution will hinge upon political and strategic approaches to this diminishing natural resource. In the Middle East, water resources are plummeting. While representing 5% of the total world population, the Middle East & North Africa (MENA) region contains only 0.9% of global water resources.1 The number of water-scarce countries in the Middle East and North Africa has risen from 3 in 1955 (Bahrain, Jordan and Kuwait) to 11 by 1990 (with the inclusion of Algeria, Israel and the Occupied Territories, Qatar, Saudi Arabia, Somalia, Tunisia, the United Arab Emirates and Yemen). Another 7 are anticipated to join the list by 2025 (Egypt, Ethiopia, Iran, Libya, Morocco, Oman and Syria). In addition to its scarcity, much of Middle Eastern water stems from three major waterways: the Tigris-Euphrates, Nile and Jordan River systems. Mutual reliance on these resources has made water a catalyst for conflict, spurring confrontations such as the 1967 War (fomented by Syria’s attempts to divert water from Israel) and the Iran-Iraq War (which erupted from disputes over water claims and availability). Recognition of water’s role as an obstacle in interstate relations has spurred numerous attempts at resolution, including diplomatic efforts (most notably the 1953-1955 U.S.-brokered Johnston negotiations) and bilateral and multilateral treaty efforts, ranging from the 1959 Agreement for the Full Utilization of Nile Waters to the 1994 Israeli-Jordanian Treaty. Along the Tigris and Euphrates Rivers, Turkey and Syria are currently approaching a massive confrontation over water resources. Relations between the two countries, strained at best, have been exacerbated since the 1980s by growing tensions over water, which have brought them to the brink of war several times. The Jordan River Basin has also emerged as a flashpoint for conflict over water. Resources in the area, suffering serious overuse as a result of pollution and population growth, have increasingly impacted interstate relations. Between Jordan and Israel, water resource issues are reaching a fever pitch. Despite the 1994 Israeli-Jordanian Treaty – which established comprehensive guidelines regulating the distribution, preservation and availability of water from the Jordan and Yarmouk Rivers – conflicts over water have risen to the forefront of relations between the two countries. Jordan, fed only by underground sources and the Jordan River, has experienced an escalating water deficit – one that is expected to reach 250 million cubic meters (nearly 1/3rd of current annual consumption) by 2010. At the same time, Israel – currently utilizing almost all available water from its National Water System (consisting of the West Bank Mountain Aquifer, the Coastal Aquifer and the Lake Kinneret Basin) – has been forced to resort to overexploitation of available resources for expanding agricultural and industrial ventures. As a result, water has become a critical bone of contention between the two countries. The historically troubled relations between Israel and the Palestinians have also been magnified by water. Mutual reliance on the West Bank Mountain Aquifer, which rests atop the demarcating border of the disputed West Bank territory (and currently provides 1/3rd of Israel’s water supply and 80% of Palestinian consumption), has created friction between the State of Israel and the Palestinian Authority.

### Water Scarcity Impact- Indo-Pak War

#### Water scarcity also causes Indo-Pak nuclear war.

Zahoor ‘11Musharaf, is researcher at Department of Nuclear Politics, National Defence University, Islamabad, “Water crisis can trigger nuclear war in South Asia,” <http://www.siasat.pk/forum/showthread.php?77008-Water-Crisis-can-Trigger-Nuclear-War-in-South-Asia>,

South Asia is among one of those regions where water needs are growing disproportionately to its availability. The high increase in population besides large-scale cultivation has turned South Asia into a water scarce region. The two nuclear neighbors Pakistan and India share the waters of Indus Basin. All the major rivers stem from the Himalyan region and pass through Kashmir down to the planes of Punjab and Sindh empty into Arabic ocean. It is pertinent that the strategic importance of Kashmir, a source of all major rivers, for Pakistan and symbolic importance of Kashmir for India are maximum list positions. Both the countries have fought two major wars in 1948, 1965 and a limited war in Kargil specifically on the Kashmir dispute. Among other issues, the newly born states fell into water sharing dispute right after their partition. Initially under an agreed formula, Pakistan paid for the river waters to India, which is an upper riparian state. After a decade long negotiations, both the states signed Indus Water Treaty in 1960. Under the treaty, India was given an exclusive right of three eastern rivers Sutlej, Bias and Ravi while Pakistan was given the right of three Western Rivers, Indus, Chenab and Jhelum. The tributaries of these rivers are also considered their part under the treaty. It was assumed that the treaty had permanently resolved the water issue, which proved a nightmare in the latter course. India by exploiting the provisions of IWT started wanton construction of dams on Pakistani rivers thus scaling down the water availability to Pakistan (a lower riparian state). The treaty only allows run of the river hydropower projects and does not permit to construct such water reservoirs on Pakistani rivers, which may affect the water flow to the low lying areas. According to the statistics of Hydel power Development Corporation of Indian Occupied Kashmir, India has a plan to construct 310 small, medium and large dams in the territory. India has already started work on 62 dams in the first phase. The cumulative dead and live storage of these dams will be so great that India can easily manipulate the water of Pakistani rivers. India has set up a department called the Chenab Valley Power Projects to construct power plants on the Chenab River in occupied Kashmir. India is also constructing three major hydro-power projects on Indus River which include Nimoo Bazgo power project, Dumkhar project and Chutak project. On the other hand, it has started Kishan Ganga hydropower project by diverting the waters of Neelum River, a tributary of the Jhelum, in sheer violation of the IWT. The gratuitous construction of dams by India has created serious water shortages in Pakistan. The construction of Kishan Ganga dam will turn the Neelum valley, which is located in Azad Kashmir into a barren land. The water shortage will not only affect the cultivation but it has serious social, political and economic ramifications for Pakistan. The farmer associations have already started protests in Southern Punjab and Sindh against the non-availability of water. These protests are so far limited and under control. The reports of international organizations suggest that the water availability in Pakistan will reduce further in the coming years. If the situation remains unchanged, the violent mobs of villagers across the country will be a major law and order challenge for the government. The water shortage has also created mistrust among the federative units, which is evident from the fact that the President and the Prime Minister had to intervene for convincing Sindh and Punjab provinces on water sharing formula. The Indus River System Authority (IRSA) is responsible for distribution of water among the provinces but in the current situation it has also lost its credibility. The provinces often accuse each other of water theft. In the given circumstances, Pakistan desperately wants to talk on water issue with India. The meetings between Indus Water Commissioners of Pakistan and India have so far yielded no tangible results. The recent meeting in Lahore has also ended without concrete results. India is continuously using delaying tactics to under pressure Pakistan. The Indus Water Commissioners are supposed to resolve the issues bilaterally through talks. The success of their meetings can be measured from the fact that Pakistan has to knock at international court of arbitration for the settlement of Kishan Ganga hydropower project. The recently held foreign minister level talks between both the countries ended inconclusively in Islamabad, which only resulted in heightening the mistrust and suspicions. The water stress in Pakistan is increasing day by day. The construction of dams will not only cause damage to the agriculture sector but India can manipulate the river water to create inundations in Pakistan. The rivers in Pakistan are also vital for defense during wartime. The control over the water will provide an edge to India during war with Pakistan. The failure of diplomacy, manipulation of IWT provisions by India and growing water scarcity in Pakistan and its social, political and economic repercussions for the country can lead both the countries toward a war. The existent A-symmetry between the conventional forces of both the countries will compel the weaker side to use nuclear weapons to prevent the opponent from taking any advantage of the situation. Pakistan's nuclear programme is aimed at to create minimum credible deterrence. India has a declared nuclear doctrine which intends to retaliate massively in case of first strike by its' enemy. In 2003, India expanded the operational parameters for its nuclear doctrine. Under the new parameters, it will not only use nuclear weapons against a nuclear strike but will also use nuclear weapons against a nuclear strike on Indian forces anywhere. Pakistan has a draft nuclear doctrine, which consists on the statements of high ups. Describing the nuclear thresh-hold in January 2002, General Khalid Kidwai, the head of Pakistan's Strategic Plans Division, in an interview to Landau Network, said that Pakistan will use nuclear weapons in case India occupies large parts of its territory, economic strangling by India, political disruption and if India destroys Pakistan's forces. The analysis of the ambitious nuclear doctrines of both the countries clearly points out that any military confrontation in the region can result in a nuclear catastrophe. The rivers flowing from Kashmir are Pakistan's lifeline, which are essential for the livelihood of 170 million people of the country and the cohesion of federative units. The failure of dialogue will leave no option but to achieve the ends through military means.

### Water Scarcity Impact- Asia War

#### Water scarcity causes wars in asia

Priyadarshi 2012, Nitish, lecturer in the department of environment and water management at Ranchi University in India, “War for water is not a far cry” http://www.cleangangaportal.org/node/44

Water stress is set to become Asia’s defining crisis of the twenty-first century, creating obstacles to continued rapid economic growth, stoking interstate tensions over shared resources, exacerbating long time territorial disputes, and imposing further hardships on the poor. Asia is home to many of the world’s great rivers and lakes, but its huge population , pollution and exploding economic and agricultural demand for water make it the most water-scare continent on a per capita basis. Many of Asia’s water sources cross national boundaries, and as less and less water is available, international tensions will rise. The poor management of river basins, environmentally unsustainable irrigation practices, an overuse of groundwater, and the contamination of water sources have all helped aggravate Asian water woes. The over exploitation of subterranean water in the large parts of the Asia has resulted in a rapidly falling groundwater saturation level- known as the water table. In the Gangetic delta, wells have tapped into naturally occurring arsenic deposits, causing millions of people in Bangladesh, and Eastern India including Jharkhand and Bihar to be exposed to high levels of poisonous arsenic in drinking water and staple agricultural products like rice. In some Asian coastal areas, the depletion of groundwater has permitted saline seawater to flow in to replace the freshwater that has been extracted. The Ganga, which is virtually synonymous with Indian civilisation, is dying. Pollution, over-extraction of water, emaciated tributaries and climatic changes are killing the mighty river, on whose fecund plains live one in 12 people of this planet. The Ganga basin makes up almost a third of India's land area and its rich soil is home to millions of people. However, indiscriminate extraction of water with modern tube wells from the river as well as its basin, coupled with the damming of its tributaries for irrigation, have seriously reduced its flow. Climate change has added to the threat. Rivers are the lifeblood of the Bangladesh economy and social life. Its cultural life is also deeply related to rivers. It is extremely unfortunately that its three main rivers, Ganges-Padma, Brahmaputra-Jamuna and Surma-Meghna are dying. As per a survey of the Bangladesh Water Development Board (BWDB), there are three hundred and ten rivers in Bangladesh. Out of these fifty-seven are border rivers, the condition of one hundred and seventy five is miserable, and sixty five are almost dead. Eighty percent of the rivers lack proper depth. The latest study reveals that one hundred and seventeen rivers are either dead or have lost navigability . Such rivers/canals include Brahamaputra, Padma, Mahananda, Gorai, Meghna, Titas, Gomati, Kushiara, Dhaleswari, Bhairab, Sitalksha, Turag etc. As per a report of BWDB, India is controlling the water of 57 rivers along with the Farakka barrage. Because of inadequate facilities for dredging, these rivers have become canals. Additionally, India has withdrawn water of several rivers including Surma, Kushiara and Mahananda. Sluice gates have been constructed on the rivers Senoa, Jamuna, Panga, Pan, Hatoori and Sui (situated near Panchagarh). Apart from the scourge of Farakka barrage, a new dam, named Tipaimukh dam, is under construction in India. Asia will continue to have the world’s largest number of people without basic or adequate access to water. The Asian water sector is plagued by serious problems, including inadequate infrastructure and poor system maintenance, financially strapped utilities, low-cost recovery, growing pollution, watershed degradation, and unsustainable groundwater extraction. Owing to leaks and system inefficiencies, a sizable portion of the water supply is lost before reaching the consumer. As water distress intensifies and global warming accelerates, local, national, and interstate disputes over water are likely to become endemic in Asia. Water, for its part, could trigger increased conflicts within and between states, and open new political disputes in Asia. Water shortages, likely to be aggravated by fast-rising use and climate change, pose a potential threat to political stability, economic modernization, public health, food security, and internal cohesion in a number of Asian states. A study of Asia’s biggest rivers-the Indus, the Brahmaputra, the Yangtze, the Yellow, and the Ganges-by different experts has found that the “ upstream snow and ice reserves of these basins-important in sustaining seasonal water availability- are likely to be affected substantially by climate change,” although the extent of impact will vary from basin to basin.

#### Water wars are the destabilizing issue for Asia

Chellaney 2013 [Brahma, a professor at the New Delhi-based Center for Policy Research, Interview: Author Discusses Asia's Water Woes <http://www.rferl.org/content/asia-water-woes/24882816.html>

Brahma Chellaney, a professor at the New Delhi-based Center for Policy Research, has sounded alarms about the potential for conflict over water resources in Asia. In his award-winning book, "Water: Asia's Next Battleground," Chellaney argues that Asia has less freshwater per capita than any other continent, but is both guzzling and polluting its resources at an ever-increasing rate. RFE/RL correspondent Courtney Brooks speaks with Chellaney about where the potential conflicts lie. RFE/RL: What are some of the hotspots for water disputes in Asia and how do you see the situation evolving? Brahma Chellaney: I see water becoming an increasingly divisive issue in large parts of Asia -- the Middle East, Central Asia, and [the] Caucasus, for example. I see water stress being a driver of conflict. RFE/RL: You mention in your book that battle lines in Afghanistan tend to follow the lines of water courses. What exactly does that mean? Can you give me some examples? Chellaney: Afghanistan and Yemen are examples where internal conflicts are being waged along hydrological lines. Where waterways run those lines of water courses tend to be the lines separating feuding parties because the object of control in the feud is control of a water source. And in Afghanistan we are finding that in some parts where scarcity is acute the control of wells and streams has become a source of conflict by itself. Warlords have emerged that can be called water warlords, whose basic job is to maintain control over a source of water. These are warlords with militias, and they are controlling sources of water for their community or for their province and such kind of overt use of force to assert control over a source of water is found in Afghanistan more than any other country. RFE/RL: And the situation in Central Asia? Chellaney: Water is the most divisive issue in Central Asia. Along with unsettled borders, water has become an even more explosive issue. Because you have in some parts of Central Asia borders that are not clearly demarcated and therefore the issue of water sharing and transnational water resources, their delineation. These issues are compounding the interstate and intrastate competition [and] the struggle for water. Water is clearly, of all issues, the one that carries the highest risk of destabilizing Central Asia. And also, Central Asia is a very water-scarce region, and therefore the struggle is over scarce resources. The only countries that actually have the water resources are the small upstream countries of Kyrgyzstan and Tajikistan, [which are] small and powerless against the main users of water -- the countries located downstream: Uzbekistan, Turkmenistan, and Kazakhstan. Standing Up To China RFE/RL: You note that China supplies water to Russia, Kazakhstan, and Kyrgyzstan. Can you explain these hydrological ties? Chellaney: China, because of its control of the Xinjiang [region], which it absorbed forcibly in 1949, has become the source of water [supplies] to Russia, to Kazakhstan, and to Kyrgyzstan. For example, the Black Irtysh flows to Kazakhstan and then goes on to Russia. It connects with the Ob River in Russia. And then there's the other river called the Ili River, [which] has caused a lot of disquiet in Kazakhstan and Russia because these are important rivers for Russia, for western Siberia, and for Kazakhstan. And Lake Balkhash in Kazakhstan faces the danger of becoming another Aral Sea -- because of the upstream diversion of the waters of the Ili River by China through new irrigation and other hydro projects. RFE/RL: And how has all of this affected relations between China, Russia, Kazakhstan, and Kyrgyzstan? Chellaney: The relationship between Kazakhstan and China has an undercurrent of tension, but Kazakhstan is a weaker state, and so also is Kyrgyzstan. Therefore, these two countries can merely protest. They can do little about Chinese actions, but they tend to be more vocal in private rather than in public. Yet, to the credit of the Kazakh government, it has raised this issue publicly also, talked about China's unilateral projects on the Ili River and the Black Irtysh (Kara-Irtysh) River. And the Russians, being a large country which is able to deal with China on a legal basis, the Russians have been the most vocal in public. But apart from protests even the Russians find that their options are constricted because, after all, what can they do? They can't wage a war to stop Chinese dam-building activity. Short of military action they have tried everything else -- they have tried diplomacy, they have tried protesting loudly, they've tried reasoning with the Chinese -- and nothing has worked. Economic Impacts RFE/RL: You write in your book that Pakistan is a water-distressed country, but you also say that India gives Pakistan 80 percent of its own water, which in turn has a severely negative impact on India's own hydrological health. Can you please explain the state that Pakistan is in? Chellaney: The reason why the water situation in Pakistan has deteriorated is that Pakistan is growing food for export. It's a water-distressed country which is exporting products that are water-intensive. It's growing rice and cotton, which are the two most water-intensive of all agricultural products, for export. It's the world's third-largest exporter of rice and the fourth-largest producer of cotton in the world. And what that shows is that Pakistan's water distress can only be rectified through an overhauling of the economy and by changing the present pattern of growing water-rich crops for export. RFE/RL: What effect do you think Tajikistan's Rogun Dam would have both economically and on relations between neighboring countries if it were to be completed? Chellaney: The Rogun Dam is a Soviet-era enterprise which has been stalled by Uzbek threats against the upstream country [which is Tajikistan]. There's also the Vakhsh Dam (eds.: Sangtuda hydropower plants) from the Soviet-era that Tajikistan wants to build but the Uzbeks have threatened military reprisals privately and even publicly. And I think given the fact that Uzbekistan is located downstream, but able to assert its political and military supremacy in the region, Tajikistan and Kyrgyzstan find themselves hamstrung. They're not able to embark on projects because the downstream power is unwilling to provide consent, and they're too afraid to embark on projects on their own. So I don't think the Rogun Dam or the Vakhsh Dam will ever be built given the power realities in Central Asia. But if either of the dams were built or both dams were built the downstream flows to Uzbekistan are likely to be affected, and of course every dam has an ecological impact, especially large dams, and these are large dams that were proposed during the Soviet era.

### Impact- AT No Escalation

**They escalate and pull global conflicts**

Reilly 2002 (Kristie, Editor for In These Times, a nonprofit, independent, national magazine published in Chicago. We’ve been around since 1976, fighting for corporate accountability and progressive government. In other words, a better world, “NOT A DROP TO DRINK,” http://www.inthesetimes.com/issue/26/25/culture1.shtml)¶ \*Cites environmental thinker and activist Vandana Shiva Maude Barlow and Tony Clarke—probably North America’s foremost water experts

The two books provide a chilling, in-depth examination of a rapidly emerging global crisis. “Quite simply,” Barlow and Clarke write, “unless we dramatically change our ways, between one-half and two-thirds of humanity will be living with severe fresh water shortages within the next quarter-century. … The hard news is this: Humanity is depleting, diverting and polluting the planet’s fresh water resources so quickly and relentlessly that every species on earth—including our own—is in mortal danger.” The crisis is so great, the three authors agree, that the world’s next great wars will be over water. The Middle East, parts of Africa, China, Russia, parts of the United States and several other areas are already struggling to equitably share water resources. Many conflicts over water are not even recognized as such: Shiva blames the Israeli-Palestinian conflict in part on the severe scarcity of water in settlement areas. As available fresh water on the planet decreases, today’s low-level conflicts can only increase in intensity.

#### Key to deescalate conflicts

Palley ‘11 Reese Palley, The London School of Economics, 2011, The Answer: Why Only Inherently Safe, Mini Nuclear Power Plans Can Save Our World, p. 168-71

The third world has long been rent in recent droughts, by the search for water. In subsistence economies, on marginal land, water is not a convenience but a matter of life and death. As a result small **wars have been fought, rivers diverted, and wells poisoned in what could be a warning of what is to come as industrialized nations begin to face failing water supplies.** Quite aside from the demand for potable water is the dependence of enormous swaths of industry and agriculture on oceans of water used for processing, enabling, and cleaning a thousand processes and products. It is interesting to note that fresh water used in both industry and agriculture is reduced to a nonrenewable resource as agriculture adds salt and industry adds a chemical brew unsuitable for consumption. More than one billion people in the world already lack access to clean water, and things are getting worse. Over the next two decades, the average supply of water per person will drop by a third, **condemning millions** of people **to** waterborne **diseases** and an avoidable premature death.81 So **the stage is set for water access wars between** the **first and the third worlds**, between **neighbors** downstream of supply, between **big industry** and big agriculture, between **nations**, between **population** centers, and ultimately between you and the people who live next door for an already inadequate world water supply that is not being renewed. **As populations inevitably increase, conflicts will intensify**.82 It is only by virtue of the historical accident of the availability of nuclear energy that humankind now has the ability to remove the salt and other pollutants to supply all our water needs. The problem is that **desalination is an intensely local process**. Some localities have available sufficient water from renewable sources to take care of their own needs, but not enough to share with their neighbors, and it **is here that the scale of nuclear energy production must be defined locally.** Large scale 1,000 MWe plants can be used to desalinate water as well as for generating electricity However we cannot build them fast enough to address the problem, and, if built they would face the extremely expensive problem of distributing the water they produce. Better, much better, would be to use small desalinization plants sited locally. Beyond desalination for human use is the need to green some of the increasing desertification of vast areas such as the Sahara. Placing twenty 100 MWe plants a hundred miles apart along the Saharan coast would green the coastal area from the Atlantic Ocean to the Red Sea, a task accomplished more cheaply and quickly than through the use of gigawatt plants.83 This could proceed on multiple tracks wherever deserts are available to be reclaimed. Leonard Orenstein, a researcher in the field of desert reclamation, speculates: If most of the Sahara and Australian outback were planted with fast-growing trees like eucalyptus, the forests could draw down about 8 billion tons of carbon a year—nearly as much as people emit from burning fossil fuels today. As the forests matured, they could continue taking up this much carbon for decades.84 The use of small, easily transported, easily sited, and walk away safe nuclear reactors dedicated to desalination is the only answer to the disproportionate distribution of water resources that have distorted human habitation patterns for millennia. Where there existed natural water, such as from rivers, great cities arose and civilizations flourished. Other localities lay barren through the ages. We now have the power, by means of SMRs profiled to local conditions, not only to attend to existing water shortages but also to smooth out disproportionate water distribution and create green habitation where historically it has never existed. **The endless wars that have been fought**, first over solid bullion gold and then over oily black gold, **can now engulf us in the desperate reach for liquid blue gold. We need never fight these wars again as we now have the nuclear power to fulfill the** biblical **ability to “strike any local rock and have water gush forth**.”

### Impact- AT Diplomacy

#### No diplomacy or institutions

Radin 2010 Adam, masters in security studies from the naval postgraduate school, “the security implications of water: prospects for instability or cooperation in south and central asia”, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA518674 Accessed 1/16/2013 DMW]

Water, an issue so important to numerous facets of each state’s economy and overall stability, must not be left to loosely observed and nonbinding agreements. Tajikistan has even gone as far as to appeal to the United Nations General Assembly to focus on the “Central Asia water dilemma.”142 In a region that is still developing, and where the government’s survival rely more on its relations with it people versus its regional neighbors, domestic needs will continue to trump international cooperation. As Linn notes in his plan, the need for global actors to take an active role is likely needed in order for sustained cooperation. Additionally, this also provides an opportunity for Russia to actively insert itself through diplomacy and infrastructural investments, seeing that they still consider the CARs under their sphere of influence.143¶ The chapter presents a contrasting case study to South Asia, as in Central Asia water is not viewed as a regional security issue, but in terms of fulfilling short-term domestic needs. Without the looming threat of conflict or significant retribution from regional neighbors, cooperation is consistently undervalued and abandoned once domestic pressures increase. The problem with this pattern is that resources will likely continue to deteriorate and the CARs will continue to be dependent on each other to provide water and energy. Without sustained and flexible cooperation, the region at the very least will see greater stresses on government to provide for their populations, leading to domestic and potential regional instability.

# Aquaculture Advantage

### UQ: Fisheries = Brink

#### Global fish shortage is coming

Alex Salkever 9, Senior Writer at AOL DailyFinance covering technology and greentech, “Sushi salvation: Startup sees future of fish farms in giant Kevlar spheres,” 11-4-9, <http://www.dailyfinance.com/2009/11/04/sushi-salvation-startup-sees-future-of-fish-farms-in-giant-kevl/> DOA: 6-24-14, y2k

That luscious ahi tuna roll you chowed down on at your local sushi joint? It's the same as eating an endangered Siberian tiger. Well, not quite. But scientists are increasingly worried that ahi, the blood-red belle of the raw-fish ball, is being quickly fished to extinction courtesy of the never-ending quest for superior sushi. But now, a small startup in Hawaii has an ambitious goal to save the ahi. Its secret weapon? A giant, self-powered, Kevlar-coated ball that could prove a perfect way to raise tuna in captivity and supply discerning fish fiends with their piscine fix without further depleting wild stocks. The company, Hawaii Oceanic Technology, was founded by Paul Troy, a former professor of oceanography at the University of Hawaii. A tinkerer and inventor, Troy had long followed the plight of marine fisheries. Three years ago, he began to sketch a plan for a radical new form of fish farming that would appease hard-core environmentalists and provide restaurants and fish markets with a reliable supply of ahi and, potentially, numerous other forms of seafood favored by homo sapiens. Troy envisioned giant floating balls that could circulate and move up and down in the water column. He laid out a formal design for the system, filed patents, and started work on a prototype. Dubbed Oceanspheres, these balls will be constructed with an aluminum frame sheathed in Kevlar embedded with nanoscale anti-fouling particles. Kevlar was selected because water slips through it very easily, reducing drag on the cages, but the material is strong enough that sharks and other predators can't chew through it. As Reliance on Fish Farms Grows, So Does Environmental Cost Troy's timing is impeccable. No doubt, the world needs more righteous fish. Demand for seafood is rising at double the rate of population growth, according to the United Nation's Fisheries and Aquaculture Organization. But many wild fisheries have showed significant signs of strain and even collapse, including the Pacific salmon and the Atlantic cod and bluefin tuna populations. Much of the growing demand is being met through aquaculture, which provides 43 percent of the world's seafood according to the FAO. However, environmentalists and scientists have long held significant environmental and health concerns about current aquaculture methods. Most of the industry remains unregulated and practices vary widely from country to country. Onshore and near shore practitioners often use high doses of antibiotics to keep their fish alive and allow them to grow quickly in environments that could not normally sustain dense fish populations. Instances of fish farmers in Asia using chemicals toxic to humans in order to boost yields have caused significant reputational damage to the industry. And discharges of fecal matter from high-density farms have concerned health advocates and recreational fishermen alike. Additionally, many fish farms in coastal waters use species that are not endemic to the area. Often bred for rapid growth and weight gain, these farmed fish have the potential to cause problems for native species and potentially out-compete local populations if they escape from their pens or cages, a regular occurrence on many fish farms. The presence of farms in near-shore and coastal areas also creates conflicts with boaters and recreational fishermen. Great High-Tech Balls of Fish Troy believes his system can address all these concerns. Each Oceansphere will have a volume of 82,500 cubic meters and a diameter of roughly 50 meters, large enough to comfortably hold over 1,000 tons of seafood at densities that are very low compared to those found in traditional aquaculture. Unlike existing open-water aquaculture cage systems, Troy's system would require no tethers. The tops of the spheres would float roughly 25 meters below the surface most of the time. The spheres could be raised to the waterline for replenishment of feed pellets and restocking or harvest, and can drop well below the 25 meter mark to grow fish species more accustomed to deeper depths. Attached to the spheres will be small thrusters powered by ocean thermal energy conversion (OTEC). This is a system harvests the unlimited thermal energy of the ocean by sucking up colder water from below the sphere as well as warm water from above the sphere. The warm and cold water go into a type of heat exchanger, which converts the thermal differential into electricity to power the directional motors, telemetry, automated fish feed dispensers and other onboard systems. Similar systems are already used to power submarines and other submersible vehicles. The OTEC units allow the Oceanspheres to travel independently on predetermined courses, a capability that could alleviate concerns about fish feces by allowing for waste dispersal over wide areas. The self-propulsion and navigational capabilities also allow for Oceanspheres to be located in much deeper waters, where tethered cages can't be used.

### UQ: Food Shortage

#### Global food crisis is inevitable and triggers massive international instability---US output is key.

John Vidal 12 is the Guardian's environment editor. He joined the paper in 1995 after working for Agence France Presse, North Wales Newspapers and the Cumberland News. He is the author of McLibel: Burger Culture on Trial (1998) and has contributed chapters to books on topics such as the Gulf war, new Europe and development, “UN warns of looming worldwide food crisis in 2013,” The Observer, Saturday 13 October 2012, <http://www.guardian.co.uk/global-development/2012/oct/14/un-global-food-crisis-warning>, Accessed Date: 3-6-13 y2k

World grain reserves are so dangerously low that severe weather in the United States or other food-exporting countries could trigger a major hunger crisis next year, the United Nations has warned. Failing harvests in the US, Ukraine and other countries this year have eroded reserves to their lowest level since 1974. The US, which has experienced record heatwaves and droughts in 2012, now holds in reserve a historically low 6.5% of the maize that it expects to consume in the next year, says the UN. "We've not been producing as much as we are consuming. That is why stocks are being run down. Supplies are now very tight across the world and reserves are at a very low level, leaving no room for unexpected events next year," said Abdolreza Abbassian, a senior economist with the UN Food and Agriculture Organisation (FAO). With food consumption exceeding the amount grown for six of the past 11 years, countries have run down reserves from an average of 107 days of consumption 10 years ago to under 74 days recently. Prices of main food crops such as wheat and maize are now close to those that sparked riots in 25 countries in 2008. FAO figures released this week suggest that 870 million people are malnourished and the food crisis is growing in the Middle East and Africa. Wheat production this year is expected to be 5.2% below 2011, with yields of most other crops, except rice, also falling, says the UN. The figures come as one of the world's leading environmentalists issued a warning that the global food supply system could collapse at any point, leaving hundreds of millions more people hungry, sparking widespread riots and bringing down governments. In a shocking new assessment of the prospects of meeting food needs, Lester Brown, president of the Earth policy research centre in Washington, says that the climate is no longer reliable and the demands for food are growing so fast that a breakdown is inevitable, unless urgent action is taken. "Food shortages undermined earlier civilisations. We are on the same path. Each country is now fending for itself. The world is living one year to the next," he writes in a new book. According to Brown, we are seeing the start of a food supply breakdown with a dash by speculators to "grab" millions of square miles of cheap farmland, the doubling of international food prices in a decade, and the dramatic rundown of countries' food reserves. This year, for the sixth time in 11 years, the world will consume more food than it produces, largely because of extreme weather in the US and other major food-exporting countries. Oxfam last week said that the price of key staples, including wheat and rice, may double in the next 20 years, threatening disastrous consequences for poor people who spend a large proportion of their income on food. In 2012, according to the FAO, food prices are already at close to record levels, having risen 1.4% in September following an increase of 6% in July. "We are entering a new era of rising food prices and spreading hunger. Food supplies are tightening everywhere and land is becoming the most sought-after commodity as the world shifts from an age of food abundance to one of scarcity," says Brown. "The geopolitics of food is fast overshadowing the geopolitics of oil." His warnings come as the UN and world governments reported that extreme heat and drought in the US and other major food-exporting countries had hit harvests badly and sent prices spiralling. "The situation we are in is not temporary. These things will happen all the time. Climate is in a state of flux and there is no normal any more. "We are beginning a new chapter. We will see food unrest in many more places. "Armed aggression is no longer the principal threat to our future. The overriding threats to this century are climate change, population growth, spreading water shortages and rising food prices," Brown says.

#### Food crisis is inevitable---US is key

Lester R. Brown 12 is a United States environmental analyst, founder of the Worldwatch Institute, and founder and president of the Earth Policy Institute, “The world is closer to a food crisis than most people realize,” 24 July 2012, <http://www.guardian.co.uk/environment/2012/jul/24/world-food-crisis-closer>, Accessed Date: 3-15-13 y2k

In the early spring this year, US farmers were on their way to planting some 96m acres in corn, the most in 75 years. A warm early spring got the crop off to a great start. Analysts were predicting the largest corn harvest on record. The United States is the leading producer and exporter of corn, the world's feedgrain. At home, corn accounts for four-fifths of the US grain harvest. Internationally, the US corn crop exceeds China's rice and wheat harvests combined. Among the big three grains – corn, wheat, and rice – corn is now the leader, with production well above that of wheat and nearly double that of rice. The corn plant is as sensitive as it is productive. Thirsty and fast-growing, it is vulnerable to both extreme heat and drought. At elevated temperatures, the corn plant, which is normally so productive, goes into thermal shock. As spring turned into summer, the thermometer began to rise across the corn belt. In St Louis, Missouri, in the southern corn belt, the temperature in late June and early July climbed to 100F or higher 10 days in a row. For the past several weeks, the corn belt has been blanketed with dehydrating heat. Weekly drought maps published by the University of Nebraska show the drought-stricken area spreading across more and more of the country until, by mid-July, it engulfed virtually the entire corn belt. Soil moisture readings in the corn belt are now among the lowest ever recorded. While temperature, rainfall, and drought serve as indirect indicators of crop growing conditions, each week the US Department of Agriculture releases a report on the actual state of the corn crop. This year the early reports were promising. On 21 May, 77% of the US corn crop was rated as good to excellent. The following week the share of the crop in this category dropped to 72%. Over the next eight weeks, it dropped to 26%, one of the lowest ratings on record. The other 74% is rated very poor to fair. And the crop is still deteriorating. Over a span of weeks, we have seen how the more extreme weather events that come with climate change can affect food security. Since the beginning of June, corn prices have increased by nearly one half, reaching an all-time high on 19 July. Although the world was hoping for a good US harvest to replenish dangerously low grain stocks, this is no longer on the cards. World carryover stocks of grain will fall further at the end of this crop year, making the food situation even more precarious. Food prices, already elevated, will follow the price of corn upward, quite possibly to record highs. Not only is the current food situation deteriorating, but so is the global food system itself. We saw early signs of the unraveling in 2008 following an abrupt doubling of world grain prices. As world food prices climbed, exporting countries began restricting grain exports to keep their domestic food prices down. In response, governments of importing countries panicked. Some of them turned to buying or leasing land in other countries on which to produce food for themselves. Welcome to the new geopolitics of food scarcity. As food supplies tighten, we are moving into a new food era, one in which it is every country for itself. The world is in serious trouble on the food front. But there is little evidence that political leaders have yet grasped the magnitude of what is happening. The progress in reducing hunger in recent decades has been reversed. Unless we move quickly to adopt new population, energy, and water policies, the goal of eradicating hunger will remain just that. Time is running out. The world may be much closer to an unmanageable food shortage – replete with soaring food prices, spreading food unrest, and ultimately political instability– than most people realise.

#### Food shortage is inevitable---US is key

Bill Witherell 12 is Cumberland’s Chief Global Economist, “What the Threat of a Global Food Crisis Means for World Markets,” 8-12-12, <http://www.businessinsider.com/what-the-threat-of-a-global-food-crisis-means-for-world-markets-2012-8>, Accessed Date: 3-6-13 y2k

The global food crisis of 2007-2008 is threatening to repeat in the coming months, as the worst drought in 50 years devastates the US corn crop, with 51% of the crop rated "Poor/very poor" by the US Department of Agriculture. This crop is said to be on a par with that of 1988 crop, the worst in the past thirty years. Note that the US is the top producer and exporter of corn. Our account for nearly half of the world's corn and also a third of the world's soybeans, the harvest for which will be the lowest in five years. The director-general of the UN's Food and Agriculture Organization, José Graziano da Silva, characterizes the present global food situation as "precarious," as do experts we have contacted. The food crisis in 2008 led to riots in some 30, mainly very poor, countries and immeasurable hardships in many more. Following that crisis, governments vowed to act to improve global food security, including at a G8 Summit in Italy in 2009. The followup is reported to have been a mixture of some gains and some disappointments. Among the gains are the provision of improved strains of some crops and increased agricultural aid. There have been disappointments in the areas of humanitarian food aid and a failure to agree on binding agreements to regulate food export bans. The 2008 crisis was made more severe by export restrictions by some important agricultural producers, including Russia and the Ukraine.

### Internal Link: OTEC K2 Aquaculture

#### OTEC is key to sustainable agriculture production

Shylesh Muralidharan 12, a Systems Design and Management graduate student in the Engineering Systems Division, “Assessment of Ocean Thermal Energy Conversion,” 2-1-12, DOA: 6-24-14, y2k

6-.3.Marine culture Marine food production is a potential by-product of OTEC power plants. With the alarming loss of topsoil throughout the world our agricultural production will not he able to keep up with increase in demand. Hence, ocean may well become our most important source of food, even more important than the power generated. The ocean is the one of the greatest potential source of food and OTEC might just be the answer for producing more food. Deep ocean water contains a much higher percentage of nitrates and phosphates than contained in the upper layers. Studies show that when cold waters are brought to the surface by upwelling, the ﬁsh-production is signiﬁcantly increased. The greatest ﬁsh-producing area in the world is off the west coast of South America where the Humboldt Current brings deep water to the surface, and supplies t.l1e fertilizer to produce millions of tons of ﬁsh annually. Since an ocean thermal power plant necessarily pumps up cold water to be utilized in the plant, and since the process warms this water in the plant, it is natural to think that this nutrient rich water can be discharged into the near—surface zone where sunlight can promote growth of micro-organisms and the entire chain of maarine life developed from this food supply. This valuable by—product can be cultured in open systems near the surface or in closed systems with pens and fences.

#### Key to agriculture and fish farming

GuamPDN 8, “With OTEC, we might export electricity,” 3-10-8, <http://www.guampdn.com/article/20080310/OPINION02/803100311/With-OTEC-we-might-export-electricity>, DOA: 6-24-14, y2k

You've got to hand it to those Palauan guys. They have given some thought to eliminating our need for oil to power our generating plants. Such a breakthrough is needed now for the islands and, yes, the world. The government of Palau has asked the U.S. Trade and Development Agency to fund a feasibility study on an ocean thermal energy conversion, or OTEC, and fresh water production facility. Wonderful. The letter to the U.S. Trade and Development Agency may wind up in the round file, and was written by Tommy Remengesau, the bright young president of Palau. The idea of converting the deep sea water into energy is not a pipe dream. It could be a reality. The idea does work. OTEC generates electricity by using the temperature differences between the deep ocean and shallow waters. All isolated islands, like Palau and Guam, find themselves in deep trouble. As Remengesau pointed out in the letter because of Palau's remote location, producing electrical power by conventional methods doesn't have the economies of scale. The cost of electricity in Palau is more than 35 cents per kilowatt hour, or over eight times the average cost of production in the United States. The average Palauan spends even more to cool his house or refrigerate his food than do the people of Guam. I, personally, have been an enthusiast about the OTEC method of producing electricity for years. I have followed the successful building of a trial plant in Hawaii, and have wondered: Why the delay in upsizing the OTEC production to a full-scale plant that could conceivably work for all the islands in the Pacific? Guam, I have long believed, could well become the "Saudi Arabia" of the Pacific because we have deep and cold water nearby. That is the main ingredient for success in OTEC -- deep water, the technology and money. The OTEC facility is estimated to cost around $250 million, which is more than small islands can afford. Still, if we can produce electricity inexpensively, the next steps are underwater cables between Guam and Saipan or Rota, or a new method to store the surplus of power produced. Remengesau said that Palau's proposal for a feasibility study is similar to a program the U.S. Navy is currently negotiating for the development of a commercial scale OTEC facility at the American Naval Base in Diego Garcia. The Navy should also be interested in developing a similar plant for Guam where it has big needs for power. A second advantage in the OTEC device is that some of this cold water piped up from the sea could be converted into fresh water for the island people. Some even claim that this water from the ocean could be used for agriculture and fish farming.

### Internal Link: Aquaculture K2 Food Security

#### Aquaculture is key to food security

Kona Blue Water Farms 3, “Final Environmental Assessment For an Offshore Open Ocean Fish Farm Project Off Unualoha Point, Kona, Hawaii,” 7-29-3, <http://www.gulfcouncil.org/Beta/GMFMCWeb/Aquaculture/FINAL%20EA%201cii.pdf>, DOA: 6-24-14, y2k

The seafood component of the U.S. trade deficit currently runs at over US$7 billion annually, and is increasing at around 12% p.a. (Seafood Market Analyst, 2001). While the demand for seafood increases, capture fisheries around the world are collapsing from overfishing. In the U.S., closures or buyback schemes to reduce effort have effectively shut down once-productive fisheries for Atlantic tunas and swordfish, the groundfish of Georges Bank and other Northeast fisheries, Pacific Coast anchovies and albacore, and recently snapper fisheries along the whole Pacific coast. Other environmental concerns for endangered species or marine mammals have seen closures or limitations placed on fisheries for shrimp in the Gulf of Mexico, purse seining for tuna in the Pacific, and most recently longlining for tuna in Hawaii and the U.S. Pacific. U.S. domestic fisheries production is currently sustained by massive harvests of pollock in the Bering Sea – a former trash fish that is now used as a surimi component. For the first time ever, in 1999, the U.S. imported more seafood than was caught by U.S. fishermen domestically. Aquaculture offers the only viable solution to the growing demand for sustainable, healthy sources of seafood for human consumption. Fish farming reduces exploitative pressure on already-depleted wild stocks, supports the growth of coastal and rural industries. and yields a product that is low in fat, and high in protein. Worldwide, aquaculture has grown at an average annual rate of almost 10% since 1984 compared with 3% for livestock meat and 1.6% for capture fisheries production. The annual contribution of aquaculture to total aquatic production increased from 16% to 26% in six years (1990 - 1996). Finfish aquaculture worldwide is estimated to be worth $4 billion annually. The total value of U.S. fish production from aquaculture is nearly $600 million, yet almost all of this production is from freshwater (catfish) or anadromous (freshwater spawning) species, such as salmon (Table 3)

#### Aquaculture is key to global hunger relief

Rebecca Heavyside 14, Skretting’s Industrial PhD Candidate, “Aquaculture and its challenges: Of such global importance, yet so little known,” 6-3-14, <http://www.forskningsradet.no/prognett-naeringsphd/Nyheter/Aquaculture_and_its_challenges_Of_such_global_imp-ortance_yet_so_little_known/1253993611592?lang=en>, DOA: 6-24-14, y2k

Aquaculture is the farming of aquatic species. This includes fish, shellfish, crustaceans, molluscs and aquatic plants – ever wondered where your fish in “fish and chips” comes from, or the prawns in your sandwich? Well, until the 1950’s these would almost exclusively have come from a fisherman with a boat and a net, yet today it is far more likely that they have come from an aqua farm. Aqua farms vary in type and size. Some involve net pens moored out at sea or in lakes; tuna and salmon farming for example. Some have large indoor tanks; such as ornamental goldfish and koi farming. Others may use man-made ponds; such as in the farming of common carp, traditional for many eastern Europeans’ Christmas dinner. Aquaculture has risen from production of less than 1 million tonnes per year in the 1950’s to 52.2 million tonnes in 2008, and has a current value of ~US$98.4 billion. This growth is immense and un-paralleled to the farming of any other species group (poultry and swine for example), and it is far outpacing the extra demands of a growing population. This can attributed to a number of factors: Changing attitudes, standards of living, and internationality have brought about a demand for a wider variety of products (e.g. sushi) and healthier foods (fish is rich in omega-3); advancements in transport and freezing technologies have also enabled worldwide exportation, and as meat prices have increased, aquaculture has decreased fish prices. heavyside2 Despite a decline in traditional capture fisheries, aquaculture offers more employment opportunities. More than 180 million people worldwide are now employed in aquaculture based activities and this is increasing approximately 3.6 percent annually. There is also practical sense in developing aquaculture. Aquaculture incurs lower feed conversion rates (100 kg feed gives 65-90 kg salmon compared to 20 kg chicken and 13 kg swine), produces less pollution, uses far less vaccines and pharmaceuticals than land animal farming, and as such is the most efficient way of producing meat. There are also far greater areas of water available for aqua farms than there is land for meat production; i.e. aquaculture is far more sustainable. One of the biggest problems of this century is the uneven distribution of food globally, generating a growing population of hungry/starving people. This is a long term problem, with no clear single solution, yet the advent of aquaculture offers a very promising tool for hunger relief.

### Impacts: Fisheries

#### Fisheries prevent extinction

**Safina 95**—PhD in Ecology from Rutgers University, “World's Imperiled Fish (Global Fish Declines)” <http://www.seaweb.org/resources/articles/writings/safina6.php> Accessed date: 8-7-12 y2k

Fishing accounts for only about one percent of the global economy. But on a regional basis, marine fishing contributes enormously to human survival. Marine fisheries contribute more of the world's animal protein than beef, poultry, or any other kind of domesticated or wild animals. In Asia, more than one billion people rely on fish as their main source of animal protein. In Southeast Asia, more than 5 million people fish full time. In northern Chile, forty percent of the population fishes. In Newfoundland, nearly all of the people fished or serviced the fishing industry until the cod collapse in the early 1990s closed the fishery. Worldwide, about 200 million people depend on fishing for their livelihoods. Because fishing generally does not require land ownership and because access is generally open, it has been termed the "employer of last resort" in the developing world; an occupation to turn to when there are no options.

### Impacts: Ag (Lugar)

#### Independently causes resource conflicts, terrorism, WMD prolif, and environmental collapse.

Richard G. Lugar 4 is former U.S. Senator – Indiana and Former Chair – Senate Foreign Relations Committee, “Plant Power”, Our Planet, 14(3), http://www.unep.org/ourplanet/imgversn/143/lugar.html

In a world confronted by global terrorism, turmoil in the Middle East, burgeoning nuclear threats and other crises, it is easy to lose sight of the long-range challenges. But we do so at our peril. One of the most daunting of them is meeting the world’s need for food and energy in this century. At stake is not only preventing starvation and saving the environment, but also world peace and security. History tells us that states may go to war over access to resources, and that poverty and famine have often bred fanaticism and terrorism. Working to feed the world will minimize factors that contribute to global instability and the proliferation of weapons of mass destruction. With the world population expected to grow from 6 billion people today to 9 billion by mid-century, the demand for affordable food will increase well beyond current international production levels. People in rapidly developing nations will have the means greatly to improve their standard of living and caloric intake. Inevitably, that means eating more meat. This will raise demand for feed grain at the same time that the growing world population will need vastly more basic food to eat. Complicating a solution to this problem is a dynamic that must be better understood in the West: developing countries often use limited arable land to expand cities to house their growing populations. As good land disappears, people destroy timber resources and even rainforests as they try to create more arable land to feed themselves. The long-term environmental consequences could be disastrous for the entire globe. Productivity revolution To meet the expected demand for food over the next 50 years, we in the United States will have to grow roughly three times more food on the land we have. That’s a tall order. My farm in Marion County, Indiana, for example, yields on average 8.3 to 8.6 tonnes of corn per hectare – typical for a farm in central Indiana. To triple our production by 2050, we will have to produce an annual average of 25 tonnes per hectare. Can we possibly boost output that much? Well, it’s been done before. Advances in the use of fertilizer and water, improved machinery and better tilling techniques combined to generate a threefold increase in yields since 1935 – on our farm back then, my dad produced 2.8 to 3 tonnes per hectare. Much US agriculture has seen similar increases. But of course there is no guarantee that we can achieve those results again. Given the urgency of expanding food production to meet world demand, we must invest much more in scientific research and target that money toward projects that promise to have significant national and global impact. For the United States, that will mean a major shift in the way we conduct and fund agricultural science. Fundamental research will generate the innovations that will be necessary to feed the world. The United States can take a leading position in a productivity revolution. And our success at increasing food production may play a decisive humanitarian role in the survival of billions of people and the health of our planet.

### Impacts: Fisheries --- Indonesia

#### Fisheries collapse triggers Indonesian instability

Elke Larsen 13, Research Assistant @ Sumitro Chair for Southeast Asia Studies, CSIS, “Southeast Asia from the Corner of 18th and K Streets: Strategies in Food Security: Thinking Seriously about Fish,” Volume IV | Issue 2 | 24th January, 2013

<http://csis.org/publication/southeast-asia-corner-18th-and-k-streets-strategies-food-security-thinking-seriously-abo>, doa: 6-24-14, y2k

With an estimated one billion people going hungry every day, food security is one of the most pressing issues the world will face this century. As an integral part of the United States’ rebalance toward Asia, food security policy needs to shift away from its historic focus on rice agriculture to address the potential disaster faced by the region’s fisheries. Fully 84 percent of global fisheries are seriously overexploited—many are near collapse—and Southeast Asia is one of the regions where this trend is most apparent. Fisheries are integral to the way of life of many Southeast Asians. Perhaps the best example of this is Indonesia, an archipelago of 17,000 islands that is home to 240 million people and houses the “Amazon” of fisheries and coral reefs within its Exclusive Economic Zone (EEZ). Fish accounts for only 5.2 percent of Indonesia’s GDP, but it provided 72 percent of its animal protein consumption in 2011. It is also the primary source of livelihood for coastal communities that have few other alternatives for employment. Indonesia faces many serious threats to its fisheries. The changing global climate caused by increased carbon emissions has resulted in the ocean absorbing more heat and becoming more acidic. These two changes are expected to radically alter traditional fish habitats around Indonesia. Currents circulating nutrients will change course and fragile coral ecosystems are expected to shrink. Because of climatic changes and environmental degradation over the past four decades, over 40 percent of coral reefs and mangroves have been destroyed in the “coral triangle” in which Indonesia is located. Beyond that, overfishing is driving Indonesian fisheries to the brink. Indonesia’s waters are “open access,” attracting not only legal fishing vessels but also illegal, unregulated, and unreported (IUU) vessels from distant nations. IUU fishing vessels are estimated to create a minimum loss of $3 billion to the Indonesian economy each year. With little policing and a growing number of industrial-scale fishing vessels entering Indonesian waters, fish are now being caught faster than they can reproduce. Aquaculture may seem like an obvious solution to this problem, but unsustainable practices like feeding farmed fish with meal made of wild fish and inefficient farming practices often increase environmental degradation and the risk of disease in the fish themselves. These problems are not unique to Indonesia. They are region-wide problems that need region-wide action. There is growing awareness in the U.S. government that the health of the region’s fish resources poses a serious threat to the people of Southeast Asia. The United States has responded by becoming one of the region’s strongest partners in the Coral Triangle Initiative, which aims to protect coral reefs and fisheries and work toward climate change adaptation in Malaysia, Indonesia, the Philippines, and other countries in the region. A joint U.S.-Indonesian statement in September 2012 included a section on supporting an Indonesian marine reserve and President Susilo Bambang Yudhoyono’s vision of a “blue economy”—an environmentally sustainable economy based on the ocean. The U.S. Agency for International Development (USAID) and the National Oceanographic and Atmospheric Administration are helping Indonesia with ocean surveillance and data collection, climate change resilience, and fishery enforcement and are working with local communities to find employment alternatives to the fishing industry. But more needs to be done in placing fisheries management firmly at the heart of Washington’s food security paradigm. This could include ensuring that environmental considerations are included in trade agreements and given increased priority in intergovernmental organizations. The United States is a major customer of Southeast Asian fisheries and it is paramount that the process of acquiring fish in the region becomes more transparent. A system of fish import certification should be implemented to ensure that the origin of fish can be traced. Currently, the Food and Drug Administration (FDA) determines the origin of a product based on where it is processed prior to arriving on U.S. shores. But this creates a loophole under which the United States can import illegally caught fish. For example, if fish is illegally sourced in Indonesian waters but processed in Thailand, it is labeled as a ‘Thai product” when it reaches the U.S. consumer. Creating a system of “catch certificates” like that implemented by the European Union in 2008 could help. However, many of the organizations offering “sustainable seafood certifications” are fakes. A U.S.-approved list of reliable certifications would keep both U.S. importers and consumers informed when they purchase seafood. The United States should also seek to expand public-private partnerships. The U.S. government and the private sector have shared interests in sustainable seafood: the private sector does not want fish stocks to become overexploited and is facing a consumer that is becoming more concerned about sustainability. A possible model for such collaboration is the Fishing and Living Initiative between USAID and Anova Food, the United States’ largest distributor of sashimi-grade tuna. Through this program, Anova purchases only pole-and-line caught tuna directly from small coastal fishing communities, thereby supporting sustainable fishing practices and the livelihoods of local fishing communities. Several systemic changes need to occur if these strategies are to be effective. First, the U.S. private sector and consumer must actively drive the demand for sustainably sourced seafood. There are some positive signs that the movement for sustainable seafood is slowly gaining momentum: since Greenpeace introduced its seafood retailer scorecard in 2008, roughly 80 percent of U.S. supermarkets have improved the sustainability of their seafood supplies. Most seriously, Southeast Asian fisheries are threatened by the lack of regulations and policing in their EEZs. With the “open-access” model already proving to be a recipe for disaster, the only logical alternative is to limit access to EEZs. Regional cooperation may be the best answer to managing migratory fish stocks. One of the best existing models for this is the Parties to the Nauru Agreement in the central Pacific that aims to limit fishery access through bilateral agreements. Such regional cooperation will fall short of expectations, however, when it faces a lack of resources to enforce the agreements, tenuous cooperation among members of the organization, and corruption within its administration. The threats faced by fisheries in Southeast Asia cannot be overemphasized. If the fisheries collapse, not only will there be food shortages, but the livelihood of millions of Southeast Asians will be destroyed. In the spirit of the United States’ rebalance toward Asia, Washington’s food security strategy must include protection of the region’s fisheries. Otherwise, the United States will miss an opportunity to help boost regional security in an area where it matters most.

### Impacts: Food Shortage --- Africa

#### Triggers instability in Mali---causes broader African instability and conflict that escalates globally

António Guterres 12 is the United Nations High Commissioner for Refugees and former prime minister of Portugal, “Why Mali Matters,” 9-4-12, <http://www.nytimes.com/2012/09/05/opinion/why-mali-matters.html>, Accessed Date: 3-6-13 y2k

The multiple crises unfolding in and around Mali today are shaped by an intersection of trends that resonate far beyond the region: food insecurity and desertification linked to climate change, incomplete democratization processes marked by social exclusion, and a growing population of young people with poor employment prospects. With its government debilitated by a coup, the Malian political system — previously an acclaimed example of democratic progress in the region — has been unable to maintain its reach into its northern regions, now characterized by trafficking in small arms, narcotics, migrants and hostages. The north of the country is under the control of militant, foreign-sponsored radical Islamist movements, the latest dangerous permutation in a century-long series of Tuareg rebellions. Reports of human rights abuses are mounting daily. As if this were not enough, the region is in the grip of a major food crisis. More than 18 million people across the Sahel are already affected by or at risk of acute food shortages. Mali now matters more than ever. And it matters for two reasons. First, the country is not the isolated place of myth that the Timbuktu legend implies. Political crisis and state fragmentation in Mali are a significant threat to political stability in the region, where bordering states such as Guinea and Côte d’Ivoire are still struggling to emerge from recent crises. There are worrying signals that the radical militant presence in northern Mali is already drawing in disaffected youths from elsewhere in the region. And the fact that a crisis of this nature has taken root so rapidly in what appeared to be a stable democracy has significant implications extending far beyond Mali’s borders. If unchecked, the Mali crisis threatens to create an arc of instability extending west into Mauritania and east through Niger, Chad and Sudan to the Horn of Africa and the Gulf of Aden, characterized by extended spaces where state authority is weak and pockets of territorial control are exercised by transnational criminals. The activities of Somali pirates in the Gulf of Aden could soon find a parallel in the arid lands of the southern Sahara. It is imperative that an early resolution to this crisis is reached, and that international support is provided to those national and regional actors who are working to secure a political settlement and to deal with the complex security issues that have emerged in the country. Second, the combination of conflict and political instability in Mali and the food crisis now taking root across the Sahel have already had acute humanitarian consequences. More than 266,000 refugees have fled Mali since January, mainly to Mauritania, Niger, Burkina Faso and Algeria. Around 174,000 people are displaced within Mali. The abrupt displacement of so many people has had profound consequences for their welfare, and aid agencies are struggling to meet their basic needs in areas that are affected by insecurity and characterized by acute logistical challenges. Cholera outbreaks have already occurred in northern Mali, and people continue to flee, placing a huge strain on local resources. Following earlier visits to Niger and Mauritania, I recently traveled to Burkina Faso. There, I met refugees who had just fled Mali, their very means of survival destroyed in the conflict and their faces marked with the strain and fear of the dispossessed. Their needs are acute — food, water, sanitation and basic health care. For the women I met, their first priority was to hold on to what little capacity they had to take care of themselves and their families, and to restore a sense of normality amidst the brutal disruption of their lives. This will become even more difficult when the dry season hits and animal stocks dwindle. Their courage and their resilience were profoundly moving. We must expand the humanitarian response to this crisis, and not allow it to slip off an international agenda that has been completely preoccupied by events in Syria. We must ensure that refuge is provided to those people who need it, that uprooted populations do not become targets for exploitation, manipulation and recruitment by armed groups, and that their capacity to remain economically active is maintained. We cannot remain indifferent to their plight. Without an adequate humanitarian response that allows people to live safely, with dignity, and with a vision of a future, disaffection and despair can themselves become factors in the perpetuation of conflict. Without an early political resolution of the crisis, there is a real risk that many of these people will be condemned to a future of protracted displacement and deprivation, just as has happened with millions of refugees from Afghanistan, Iraq and Somalia. There is also a risk that the conflict will spread, becoming a threat to regional — and even global — peace and security.

#### African instability escalates globally---causes great power conflict

Keshav Prasad Bhattarai 12 is the former President of Nepal Teachers’ Association,Teachers’ Union of Nepal and General Secretary of SAARC Teachers’ Federation and a writer for Eurasian Review, “Greater Power Involvement In “Vacuum Wars” And “Resource Trapped” Countries Of Africa – Analysis,” 8-28-12, <http://www.eurasiareview.com/28082012-greater-power-involvement-in-vacuum-wars-and-resource-trapped-countries-of-africa-analysis/> DOA: 12-31-13, y2k

Africa is gaining greater strategic significance for its natural resource abundances including high quality oil, natural gas and valuable minerals. The region known worldwide for violent extremist activities extending almost all over the continent and other potential source of threat from HIV/ AIDS, piracy and illicit trade to armed conflicts and state failures, contains two geo-strategically located shatter belts: one in Northern Africa adjoining Middle East and another in Sub Saharan Africa. Owing to the volatile geo-political situation these shatter belts may any time expand or contract but political vulnerability continues. If its North African Shatter belt implodes it can carry devastating impacts upon whole of Asia and Europe and if similar situation develops in Sub Saharan Shatter belt, it can bring similar havoc to the whole continent posing gravest danger to global peace, tranquility and safe maritime rights over international waters. In August 1990, noted American political scientist and international relation theorist John J. Mearsheimer in his provocative article in The Atlantic observed that “we will soon miss the Cold War” for “the conditions that have made for decades of peace in the West are fast disappearing, as Europe prepares to return to the multi-polar system that, between 1648 and 1945, bred one destructive conflict after another.” According to him, we may, any day wake up and lament the loss of the order that the Cold War gave to the anarchy of international relations. What Mearsheimer predicted was reflected some more on Balkans and Eastern Europe and mainly in Africa. Jakub Grygiel in the American Interest Magazine (July/ August 2009) admits that the end of the Cold War, the collapse of the Soviet Union and the prostration of states such as Somalia, Rwanda, Haiti and Bosnia, and most importantly the terrorist attacks of September 11—created impressions that weak states have unraveled because of the great powers’ disinterest in them. Grygiel further states that the “Cold War had a stabilizing effect in several strategic regions where either the United States or the Soviet Union supported recently fashioned states with little domestic legitimacy and cohesion for fear that, if they did not, the rival superpower might gain advantage”. The post-Cold War World have exhibited the great power neglect that created the number of failed states starting from within and subsequently generating spills over to other countries ranging from crime to drugs to global terrorism including 9/11. When a state weakens, becomes fragile or is going to fail, it creates a power vacuum. The stronger country in the neighborhood or some regional or international powers following the nature of international politics develop stronger desire to control the vacuum inside a fragile state for its natural resources or strategic location and that goes on weakening the state until it is declared ‘failed’. “Vacuum Wars” and “Resource Trap” in Africa Africa for long has been at the crossroads of great power competition for its tremendous wealth and trade opportunities. The continent, unfortunately being caught in a “natural resource trap” have shown how resources are wasted, considered resources as curse and even lead to destructive behavior from ethnic conflicts to civil wars – claiming lives of millions with unending chaos, anarchy and state failures. Many African countries for its abundances of high quality oil, natural gas and minerals and for pivotal location are further weakened by the strategic interests of major powers. Their invaluable resources are cruelly exploited, divisions among people are created, and political corruption is promoted so that they or their hands can grab the huge prize that a fragile country can offer. Naturally, when a state fails, it creates a vacuum. And including Nepali people, citizens in weak and fragile countries know it much better that if such states are strategically located in a major geo-political region, directly or indirectly it invites competitive great power intervention following a source of domestic conflicts; that potentially may turn into a source of great power rivalry that in turn may lead to confrontation, crisis and war. As mentioned above, there are ample evidences to support that when a state fails or becomes fragile, it becomes a playground of both regional and great power rivalry. Grygiel in his provoking essay states that as nature abhors vacuums, so does the international system. He further quotes Richard Nixon when he said to Mao Zedong, “In international relations there are no good choices. One thing is sure—we can leave no vacuums, because they can be filled.” And quite predictably, the power vacuums created by fragile or failed states attract the interests of great powers because they find it easy to expand their influence while weakening their opponents or forestalling their intervention. “A state that decides not to fill a power vacuum is effectively inviting other states to do so, thereby potentially decreasing its own relative power”.

### Impacts: Food Shortage --- Paksitan

#### Causes Pakistani instability

Michael Kugelman 10 is program associate with the Asia Program at the Woodrow Wilson International Center for Scholars, “HUNGER PAINS: Pakistan’s Food Insecurity,” 9-16-10, <http://www.wilsoncenter.org/sites/default/files/ASIA_100-412_PakistFood_rptL0713FINALVERSION.pdf>, Accessed Date: 3-15-13 y2k

Pakistan is a declared nuclear power. The Pakistan military is the world’s seventh-largest armed force, and is quite capable of addressing all but the most serious threats. Strong defense might have helped in achieving national security. However, security at the individual level remains quite questionable. According to recent reports from the UN World Food Program, almost 50 percent of the Pakistani population is food-insecure. Food inflation reached its peak in 2007–08 when it soared to 36 percent. Steady increases in the number of food-insecure individuals have led to class conflict and violence between “haves” and “have-nots,” which result in social instability. According to research carried out in 2003 by the Sustainable Development Policy Institute of Pakistan, in collaboration with the World Food Program, 52 percent of the total rural population in 80 out of Pakistan’s 120 districts is food-insecure. The 13 most food-insecure districts include Tharparkar (Pakistan’s largest desert), Dera Bugti (one of the most troubled districts in Baluchistan, where nationalist leader Akbar Bugti was assassinated during President Pervez Musharraf’s regime), North Waziristan, Musa Khel, Kharan, Shangla, Kohistan, South Waziristan, Diamer, Hangu, Bolan, Upper Dir, and Khyber. The international community might not have heard of these districts in the context of food insecurity. However, many people would easily recall that these districts are perceived as the “axis of evil” within Pakistan. There is no empirical evidence to prove that food insecurity is the only cause of militancy in the above-mentioned districts. However, it is an established fact that food insecurity leads to violence and conflict. Pakistani armed forces have already started a full-scale operation against militants in North Waziristan, Shangla, Kohistan, South Waziristan, Hangu, Upper Dir, and Khyber. Whether this operation will be helpful in eliminating the social factors that partly invoke militancy is anybody’s guess. Recognizing food insecurity as a major cause of militancy and violence, many analysts believe that in Pakistan, a “mullah-marxist nexus” is operating where religious forces are exploiting the (anti-elite) feelings of lower- and lower-middle-class food-insecure people, motivating unemployed youth to commit heinous crimes such as suicide attacks against innocent people. Here it is pertinent to mention that most suicide bombers have been young (between 15 and 24 years of age). Compromised security at one level (individual security in Pakistan’s case) compromises security at each of the other levels (national, regional, and global). Food scarcity heightens the potential for conflict, which translates into a security threat. Individual cases of relative hunger, marginalization, and poverty can turn into collective deprivation. This collective deprivation can take on a gender, class, or national identity and lead to conflict and violence.

#### Nuclear war

William Pitt 9 is a New York Times and internationally bestselling author of two books: "War on Iraq: What Team Bush Doesn't Want You to Know" and "The Greatest Sedition Is Silence”, 5/8, “Unstable Pakistan Threatens the World,” <http://www.arabamericannews.com/news/index.php?mod=article&cat=commentary&article=2183>, Accessed date: 12-3-12 y2k

But a suicide bomber in Pakistan rammed a car packed with explosives into a jeep filled with troops today, killing five and wounding as many as 21, including several children who were waiting for a ride to school. Residents of the region where the attack took place are fleeing in terror as gunfire rings out around them, and government forces have been unable to quell the violence. Two regional government officials were beheaded by militants in retaliation for the killing of other militants by government forces. As familiar as this sounds, it did not take place where we have come to expect such terrible events. This, unfortunately, is a whole new ballgame. It is part of another conflict that is brewing, one which puts what is happening in Iraq and Afghanistan in deep shade, and which represents a grave and growing threat to us all. Pakistan is now trembling on the edge of violent chaos, and is doing so with nuclear weapons in its hip pocket, right in the middle of one of the most dangerous neighborhoods in the world. The situation in brief: Pakistan for years has been a nation in turmoil, run by a shaky government supported by a corrupted system, dominated by a blatantly criminal security service, and threatened by a large fundamentalist Islamic population with deep ties to the Taliban in Afghanistan. All this is piled atop an ongoing standoff with neighboring India that has been the center of political gravity in the region for more than half a century. The fact that Pakistan, and India, and Russia, and China all possess nuclear weapons and share the same space means any ongoing or escalating violence over there has the real potential to crack open the very gates of Hell itself. Recently, the Taliban made a military push into the northwest Pakistani region around the Swat Valley. According to a recent Reuters report: The (Pakistani) army deployed troops in Swat in October 2007 and used artillery and gunship helicopters to reassert control. But insecurity mounted after a civilian government came to power last year and tried to reach a negotiated settlement. A peace accord fell apart in May 2008. After that, hundreds — including soldiers, militants and civilians — died in battles. Militants unleashed a reign of terror, killing and beheading politicians, singers, soldiers and opponents. They banned female education and destroyed nearly 200 girls' schools. About 1,200 people were killed since late 2007 and 250,000 to 500,000 fled, leaving the militants in virtual control. Pakistan offered on February 16 to introduce Islamic law in the Swat valley and neighboring areas in a bid to take the steam out of the insurgency. The militants announced an indefinite cease-fire after the army said it was halting operations in the region. President Asif Ali Zardari signed a regulation imposing sharia in the area last month. But the Taliban refused to give up their guns and pushed into Buner and another district adjacent to Swat, intent on spreading their rule. The United States, already embroiled in a war against Taliban forces in Afghanistan, must now face the possibility that Pakistan could collapse under the mounting threat of Taliban forces there. Military and diplomatic advisers to President Obama, uncertain how best to proceed, now face one of the great nightmare scenarios of our time. "Recent militant gains in Pakistan," reported The New York Times on Monday, "have so alarmed the White House that the national security adviser, Gen. James L. Jones, described the situation as 'one of the very most serious problems we face.'" "Security was deteriorating rapidly," reported The Washington Post on Monday, "particularly in the mountains along the Afghan border that harbor al-Qaeda and the Taliban, intelligence chiefs reported, and there were signs that those groups were working with indigenous extremists in Pakistan's populous Punjabi heartland. The Pakistani government was mired in political bickering. The army, still fixated on its historical adversary India, remained ill-equipped and unwilling to throw its full weight into the counterinsurgency fight. But despite the threat the intelligence conveyed, Obama has only limited options for dealing with it. Anti-American feeling in Pakistan is high, and a U.S. combat presence is prohibited. The United States is fighting Pakistan-based extremists by proxy, through an army over which it has little control, in alliance with a government in which it has little confidence." It is believed Pakistan is currently in possession of between 60 and 100 nuclear weapons. Because Pakistan's stability is threatened by the wide swath of its population that shares ethnic, cultural and religious connections to the fundamentalist Islamic populace of Afghanistan, fears over what could happen to those nuclear weapons if the Pakistani government collapses are very real. "As the insurgency of the Taliban and Al Qaeda spreads in Pakistan," reported the Times last week, "senior American officials say they are increasingly concerned about new vulnerabilities for Pakistan's nuclear arsenal, including the potential for militants to snatch a weapon in transport or to insert sympathizers into laboratories or fuel-production facilities. In public, the administration has only hinted at those concerns, repeating the formulation that the Bush administration used: that it has faith in the Pakistani Army. But that cooperation, according to officials who would not speak for attribution because of the sensitivity surrounding the exchanges between Washington and Islamabad, has been sharply limited when the subject has turned to the vulnerabilities in the Pakistani nuclear infrastructure." "The prospect of turmoil in Pakistan sends shivers up the spines of those U.S. officials charged with keeping tabs on foreign nuclear weapons," reported Time Magazine last month. "Pakistan is thought to possess about 100 — the U.S. isn't sure of the total, and may not know where all of them are. Still, if Pakistan collapses, the U.S. military is primed to enter the country and secure as many of those weapons as it can, according to U.S. officials. Pakistani officials insist their personnel safeguards are stringent, but a sleeper cell could cause big trouble, U.S. officials say." In other words, a shaky Pakistan spells trouble for everyone, especially if America loses the footrace to secure those weapons in the event of the worst-case scenario. If Pakistani militants ever succeed in toppling the government, several very dangerous events could happen at once. Nuclear-armed India could be galvanized into military action of some kind, as could nuclear-armed China or nuclear-armed Russia. If the Pakistani government does fall, and all those Pakistani nukes are not immediately accounted for and secured, the specter (or reality) of loose nukes falling into the hands of terrorist organizations could place the entire world on a collision course with unimaginable disaster. We have all been paying a great deal of attention to Iraq and Afghanistan, and rightly so. The developing situation in Pakistan, however, needs to be placed immediately on the front burner. The Obama administration appears to be gravely serious about addressing the situation. So should we all.

### Impacts: Food Shortage --- Central Asia

#### Causes Central Asian instability

Georgiy Voloshin 12 is an analyst at The Central Asia-Caucasus Institute & Silk Road Studies Program of John Hopkins University and a researcher for Wikistrat, a geopolitical consultancy. He is also an Executive Advisory Board Member of Paratus Europe Ltd., a strategic management and business consulting firm, “Central Asia’s Stability Increasingly Compromised by Ongoing Grain Crisis,”Eurasia Daily Monitor Volume: 9 Issue: 208, November 13, 2012, <http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=40102>, Accessed Date: 3-15-13 y2k

In early September, the United Nations once again warned of the growing risks of another global food crisis, following particularly bad harvests in the United States, Russia, Ukraine and other grain-producing countries. These negative developments have already led to a rapid erosion of grain reserves to their lowest level since 1974. While the average volume of such reserves was sufficient to ensure continued consumption within 107 days back in 2002, today’s stocks would not last beyond 74 days, with consumption rates steadily hovering above currently observed production levels. In October 2012, the Rome-based UN agency the Food and Agriculture Organization (FAO) released the results of its worldwide survey assessing the number of people suffering from chronic malnutrition at more than 870 million, whereas the most vulnerable populations continue to be those of the Middle East and sub-Saharan Africa (http://www.fao.org/news/story/en/item/155472/icode/; www.fao.org/news/story/en/item/161819/icode/). In this context, the food situation in Russia and Central Asia also remains difficult. In early November, the Union of Russian Millers made public its assessment of the general state of grain stocks in a country that is constantly ranked as one of the top five grain exporters in the world. In the spring of 2013, Russia may be facing a shortage of grain reserves, with available monthly stocks of about 3.5 million tons—barely adequate for the projected demand of up to 4.8 million tons. According to Arkady Gurevich, the Union’s president, Russia will most probably have to increase its wheat imports from Kazakhstan and rye imports from Germany (Novaya Gazeta, November 7). Although Russia’s Agriculture Minister Nikolai Fedorov has already dismissed the possibility of introducing an export ban on grain products, reminding that Russia still has 20 million tons of reserves carried over from past years, such a scenario should not be totally excluded. In August 2010, when Russia’s agricultural sector was taken unawares by an exceptionally long and severe drought, the government decided to enact an export ban, which lasted until July 1, 2011 (Rossiyskaya Gazeta, October 20). Albeit made necessary by domestic circumstances, this move harshly impacted overall expectations on the world grain markets and drove prices even higher, thus compromising the food security of several import-dependent countries. As for Kazakhstan, which is considered to be another major player in the global agribusiness, its 2012 grain production has been relatively bleak, mostly due to the summer heat, which presumably destroyed 1.1 billion hectares of crops (Zakon.kz, October 15). Kazakhstan’s Ministry of Agriculture recently divulged definitive figures concerning this year’s performance of the country’s agricultural sector: In 2012, Kazakhstani farmers have harvested 14.7 million tons of grain, compared to a record 26 million tons last year (Kazakhstan Today, November 6). Therefore, as Nurlan Tleubayev, the current chairman of Kazakhstan’s Grain Union, told the government in mid-October, Kazakhstan will be able to export only seven million tons of crops in 2012/2013, while it supplied over 12 million tons to the external markets one year before (Rosbalt.ru, July 11; Kazakhstan Today, October 16). Although Kazakhstan has once again succeeded in ensuring adequate amounts of grain and its byproducts in order to satisfy this year’s domestic demand, it is nevertheless being gravely impacted by price volatility and pessimistic market expectations. Between July and October 2012, the local price of grain increased from $155 to $280 per ton. In this context, the government instructed Kazakhstan’s major grain producer, the Food Corporation, to organize large-scale grain supplies to provincial markets at reduced price levels until September 2013 (Newskaz.ru, October 16). In response to the ever-shrinking surface of agricultural lands, Kazakhstan’s Land Resource Agency even suggested increasing taxes for those landowners who had preferred to abstain from any activity on their plots, therefore keeping them away from both industrial and agricultural projects (Newskaz.ru, November 5). If such tax increases ever were to be approved by Parliament, legal entities owning land in Kazakhstan would have to pay ten times more for their unused hectares and five times more for improper use (such as construction instead of agriculture or vice versa). Unlike Kazakhstan, its southern neighbors, Kyrgyzstan and Tajikistan, find themselves in far worse circumstances. While its GDP per capita shrank by 6.1 percent as compared to last year (Kabar.kg, October 30), Kyrgyzstan’s economic health and its ability to find enough budgetary funds to implement costly social programs are currently a subject of deep concern. Between July and October 2012, the price of flour in Kyrgyzstan, which has to import about a quarter of its total wheat consumption from Kazakhstan, rose by 47 percent in rural areas and 36 percent in cities. In 2011, the government of the Kyrgyz Republic could still buy wheat from Kazakhstan at $150 per ton, but now has to pay almost $340 for the same quantity. According to representatives of the UN World Food Program in Kyrgyzstan, about 18 percent of its population should be considered particularly vulnerable to the growing food security risks (Fergananews, October 13). On October 18, Kyrgyzstan’s authorities decided to unblock the country’s grain reserves in order to limit price tensions (Knews.kg, October 19), but the efficacy of such measures still has to be verified in the medium term. While neighboring Tajikistan imports half of its flour consumption from Kazakhstan, the price of Kazakhstani flour on Tajikistan’s markets has increased by 55 percent in 2012 alone, and local flour has risen in price by 44 percent (Pressa.tj, November 5). Despite the increase of grain production in Central Asia’s poorest republic in comparison with last year’s data, Tajikistan is far from immune to the deterioration of its food security. In its turn, Uzbekistan has taken steps toward diminishing its grain imports from Kazakhstan, expecting to account for only 40 percent of Kazakhstan’s total exports by 2014 instead of 67 percent today (Vesti.uz, November 7). In April 2011, Uzbekistan’s authorities already imposed a 15-percent duty on all imported flour, thus trying to boost local production (Uznews.net, March 31, 2011). However, according to grain experts, Uzbekistan’s actions may further weaken Central Asia’s grain security by destabilizing Kazakhstan’s exports without making Uzbekistan’s agriculture sufficiently competitive. While the ongoing grain crisis is equally daunting for such regions as Africa, Latin America or Southeast Asia, Central Asia’s growing food insecurity remains a particular challenge. As social tensions become increasingly acute and the limits of resource-driven economic prosperity are acknowledged even in the relatively stable Kazakhstan and Uzbekistan, the political stability of Central Asian regimes is more than ever at risk. The inability of local leaders to ensure social peace and basic living conditions in the context of expanding food commodity deficits could become a more serious threat to their political survival than the activities of organized opposition forces.

#### Draws in major powers

Dr. Hooman Peimani 2 has a PhD in International Relations with a focus on regional security from Queen’s University, Canada. As a researcher/analyst, he specializes in political, economic and military/security issues pertaining to West and South Asia.

Failed Transition, Bleak Future: War and Instability in Central Asia and the Caucasus, 142

http://books.google.com/books?id=MlxZjPQ9SFwC&pg=PP1&dq=“Failed+Transition,+Bleak+Future:+War+and+Instability+in+Central+Asia+and+the+Caucasus”&hl=en&ei=uO0nTK6EDcO88gbyiL3EDw&sa=X&oi=book\_result&ct=result&resnum=1&ved=0CCUQ6AEwAA#v=onepage&q=The%20impact%20of%20war%20and%20instability%20in%20the%20Caucasus%20or%20Central%20Asia%20will%20not%20be%20confined%20to%20the%20countries%20immediately%20affected.%20Any%20local%20conflict&f=false

The impact of war and instability in the Caucasus or Central Asia will not be confined to the countries immediately affected. Any local conflict could escalate and expand to its neighboring countries, only to destabilize its entire respective region. Furthermore, certain countries with stakes in the stability of Central Asia and/or the Caucasus could well be dragged into such a conflict, intentionally or unintentionally. Regardless of the form or extent of their intervention in a future major war, the sheer act of intervention could further escalate the war, increase the human suffering, and plant the seeds for its further escalation. Needless to say, this could only further contribute to the devastation of all parties involved and especially of the "hosting" CA or Caucasian countries. In fact, certain factors could even kindle a military confrontation between and among the five regional and non-regional states with long-term interests in Central Asia and the Caucasus. This scenario could potentially destabilize large parts of Asia and Europe. The geographical location of the two regions as a link between Asia and Europe--shared to different extents by Iran, Turkey, and Russia-- creates a "natural" geographical context for the expansion of any regional war involving those states to other parts of Asia and Europe. Added to this, Iran, China, Turkey, Russia, and the United States all have ties and influence in parts of Asia and Europe. They are also members of regional organizations such as the Economic Cooperation Organization (Iran and Turkey) or military organizations such as NATO (Turkey and the United States). These geographical, political, economic and military ties could help expand any conflict in which they are involved. For all the reasons mentioned, war and instability in the countries of the Caucasus and Central Asia will be bad news for a great number of countries, near or far. It is therefore in the interest of all the potential parties to any future military conflict in the two regions to avoid actions that could instigate it. They should also refrain from acts that could unnecessarily escalate such conflicts should they occur. On the contrary, they should employ all their powers to contain and to end such conflicts. Perhaps more importantly than any of these, they should all contribute to the efforts of the Caucasian and CA countries to revitalize their economics and resolve their disputes with their neighboring states or within their own national boundaries. One should hope that, for the sake of peace and stability, Iran, China, Turkey, Russia, and the United States will find enough incentives to become contributing partners to a process of economic growth and peaceful resolution of conflicts in the Caucasus and Central Asia. Otherwise, there is little doubt that the current pace of events in the two regions is heading toward a period of war and instability, with a devastating result for the exhausted Caucasian and CA countries. This development will contain a great potential for escalation, with severe implications for the security of many other countries in Asia and Europe.

### A2: Food Prices Not Key

#### Mathematical model validates linkages between food crisis and social instability.

Lagi et al 11 - Marco Lagi, Karla Z. Bertrand and Yaneer Bar-Yam, New England Complex Systems Institute, “The Food Crises and Political Instability in North Africa and the Middle East,” August 10, 2011, <http://arxiv.org/PS_cache/arxiv/pdf/1108/1108.2455v1.pdf>, Accessed Date: 3-15-13 y2k

The importance of food prices for social stability points to the level of human suffering that may be caused by increased food prices. The analysis we presented of the timing of peaks in global food prices and social unrest implies that the 2011 unrest was precipitated by a food crisis that is threatening the security of vulnerable populations. Deterioration in food security led to conditions in which random events trigger widespread violence. The condition of these vulnerable populations could have been much worse except that some countries controlled food prices in 2011 due to the unrest in 2008 [72{83]. Food price controls in the face of high global food prices carry associated costs. Because of the strong cascade of events in the Middle East and North Africa only some countries had to fail to adequately control food prices for events to unfold [84{88]. This understanding suggests that reconsidering biofuel policy as well as commodity market regulations should be an urgent priority for policymakers. Reducing the amount of corn converted to ethanol, and restricting commodity future markets to bona de risk hedging would reduce global food prices [66]. The current problem transcends the specific national political crises to represent a global concern about vulnerable populations and social orde.r Our analysis of the link between global food prices and social unrest supports a growing conclusion that it is possible to build mathematical models of global economic and social crises [89{98]. Identifying a signature of unrest for future events is surely useful. Significantly, prior to the unrest, on December 13, 2010, we submitted a government report [56] analyzing the repercussions of the global financial crises, and directly identifying the risk of social unrest and political instability due to food prices (see Fig. 1). This report, sub- mitted four days before the initial human trigger event, the action of Mohamed Bouazizi in Tunisia [99, 100], demonstrates that it is possible to identify early warning signs before events occur. Prediction is a major challenge for socio-economic analysis. Understanding when and whether prediction is possible is important for science and policy decisions. Our predictions are conditional on the circumstances, and thus allow for policy interventions to change them. Whether policy makers will act depends on the various pressures that are applied to them, including both the public and special interests.

# Warming Advantage

## OTEC Key to Solve

#### OTEC is key - provides baseload power and can power the globe

Blue Rise 12 [BlueRise, technology proider in the Ocean Energy Market, "Ocean Thermal Energy Conversion", <http://www.bluerise.nl/technology/ocean-thermal-energy-conversion/>]

Ocean Thermal Energy Conversion (OTEC) is a marine renewable energy technology that harnesses the solar energy absorbed by the oceans. OTEC generates electricity by exchanging heat with the warm water from the ocean surface and with the cold water from the deep ocean. The exchanged heat drives a Rankine Cycle, which converts it to electricity. The technology is viable primarily in equatorial areas where the year-round temperature differential is at least 20 degrees Celsius. One of the main advantages when comparing OTEC to other renewables, such as wind and solar energy, is the fact that OTEC is a baseload source, available day and night. This is a big advantage for tropical islands that typically have a small, isolated, electric grids, not capable of handling a large share of intermittent power. The potential of OTEC is vast. One square meter of Ocean surface area on average receives about 175 watts of solar irradiation. The total amount of globally received solar power is therefore about 90 petawatts. This is over 6,000 times the total global energy usage. If we exploit just of fraction of that energy, we have enough to power the world. Today’s advanced offshore industry provides sufficient know-how for deployment and operation in the harsh oceanic environment. Offering a continuous and environmentally clean operation, OTEC is an attractive alternative form of energy.

#### OTEC would be able to produce enough energy to fuel the world

Braun 2 [Harry Braun, Chairman of the Hydrogen Political Action Committee, 9/20/02, “OTEC Can Save the Oceans”]

The oceans contain 98 percent of the Earth's water, and they make up over 70 percent of the Earth's surface area that receives solar radiation. This makes the oceans the largest solar collector on the Earth, and it has cost nothing to build. Moreover, half of the Earth's surface lies between the latitudes 20 degrees North and 20 degrees South, which is mostly occupied by the tropical oceans where ocean thermal energy conversion (OTEC) plants could efficiently operate. According to calculations by Clarence Zener, a professor of physics at Carnegie-Mellon University, the potential energy that could be extracted by OTEC plants located in the tropical ocean areas would be approximately 60 mil-lion megawatts. Assuming the OTEC systems would have an operating capacity of about 80 percent, they would be able to generate over 400 billion megawatt-hours per year, which is more than three times the current total human annual energy consumption of roughly 150 billion megawatt-hours. Thus, OTEC systems could, in and of themselves, have the potential to generate enough electricity and/or hydrogen literally to run the world -- without using any of the earth's remaining fossil fuel reserves.

#### OTEC is best alt energy to fight warming

Huang, Krock, and Oney 3 [Joseph C. Huang Senior Scientist for the National Oceanic and Atmospheric Administration, Hans J. Krock Professor of Ocean &. Resources Engineering, University of Hawaii and Stephen K. Oney, PhD. and executive vice present of OCEES July 2003 “Revisit Ocean Thermal Energy Conversion System” <http://www.springerlink.com/content/n864l3217156h045/fulltext.pdf>]

The combination of potential benefits and advances in technology make OTEC renewable energy a very attractive system worth revisiting. It possesses formidable potential capacity to provide renewable energy and offers a significant elimination of greenhouse gas emissions. With numerous improvements and new innovations in OTEC technology, manufacturing costs have been reduced, creating a favorable financial environment for profitable investment. All these factors combined with a broad market in demand for renewable clean energy demonstrate that the current OTEC system, together with its integrated by-products, deserves a serious, critical review – from technology to economic assessment in planning for national energy security and in coping with global climate changes. The actual manufacturing cost of OTEC depends on the location of the power site. For a floating plant, the average turn key capital is estimated about 3 to 4 millions per MW, which translates into 3 to 4 cents per Kilowatt-hour. It has been shown that every one MW of electricity generated from OTEC, instead of fuel oil, can save about 40 billion barrels (BBL) of fuel oil per day (DBEDT 1993), e.g. more than $1,000 per day in current value. In a proposal for an OTEC demonstration plant of 15 MW in Hawaii, for example, it is estimated to save 600 BBL oil per day, a saving in fuel consumption alone of over $5M every year. For a 100 MW OTEC plant, the saving for oil expense is at least $36M a year.

#### OTEC leads to transition away from fossil fuels

Friedman 6 [Becca Friedman “Examining the future of Ocean Thermal Energy Conversion: [An Alternative Source Heats Up](http://hprsite.squarespace.com/an-alternative-source-heats-up/2006/2/26/an-alternative-source-heats-up.html)” Febuary 26th 2006 <http://hprsite.squarespace.com/an-alternative-source-heats-up/>]

Were its vast potential harnessed**,** OTEC could change the face of energy consumption by causing a shift away from fossil fuels. Environmentally, such a transition would greatly reduce greenhouse gas emissions and decrease the rate of global warming. Geopolitically, having an alternative energy source could free the United States , and other countries, from foreign oil dependency. As Huang said, “We just cannot ignore oceanic energy, especially OTEC, because the ocean is so huge and the potential is so big… No matter who assesses, if you rely on fossil energy for the future, the future isn’t very bright…For the future, we have to look into renewable energy, look for the big resources, and the future is in the ocean.”  ¶ ecent tragic events, and their long-term ramifications for world economic structure and the reality of our shared environmental condition. The timing is very good economically for this type of system because interest rates are very low and comparatively, fossil fuel prices are very high. It is expected that with the experience gained in building these OTEC plants, that the capital costs will decrease. As with any kind of industry, the mass production and standardization of major and minor components utilized in the OTEC system will provide significant price reductions in the capital cost.

## Yes Warming

#### Warming is real and occurring now—new study confirms.

Koebler cites **Muller 11**—Richard Muller is professor of physics at the University of California, Berkeley and a faculty senior scientist at the Lawrence Berkeley National Laboratory. “Study: Global Warming is Real” October 21, 2011  [JASON KOEBLER](file:///C:\Users\young\Desktop\AppData\Roaming\Microsoft\Word\JASON%20KOEBLER) is USAToday Staff. <http://www.usnews.com/science/articles/2011/10/21/study-global-warming-is-real>accessed date: 7-18-12 y2k

"Global warming is real," a team of scientists atthe University of California at Berkeley said Friday. Since the 1950s, [the earth has warmed about 1° C](http://berkeleyearth.org/).Last year, Richard Muller and a team of colleagues, including Saul Perlmutter, 2011 Nobel Prize winner in physics, started theBerkeleyEarth Surface Temperature study to review and assess the accuracy of existing land temperature data. The team looked attemperature datafrom 15 previous studies—amounting to some 1.6 billion combined records dating back to 1800—on the subject.  Muller says that concerns raised by global warming skeptics were specifically addressed, including the urban heat island effect, poor station quality, and data selection bias. The group's results alignedclosely with previous studies' findings, including ones carriedout by groups such as NASA, the Hadley Center, and theNational Oceanic and Atmospheric Administration.  "Our biggest surprise was that the new results agreed so closely with the warming values published previously," Muller said in a statement. "This confirms that these studies were done carefully and that potential biases identified by climate change skeptics did not seriously affect their conclusions."  The group analyzed almost all existing data on the topic, looking at climate data from approximately five times more temperature stations than previous studies used. The group released four scientific papers for peer review that they will present at the next Intergovernmental Panel on Climate Change.  Muller and his daughter, Elizabeth, who co-founded the project, said they hope the study will help silence skeptics. Elizabeth Muller said she hopes their findings will "cool the debate over global warming by addressing many of the valid concerns of the skeptics in a clear and rigorous way."  Those concerns include pointing at the urban heat island effect (a theory that because urban areas have higher land temperatures, ground temperature data from those areas artificially raise global land temperature averages), unreliable temperature stations (Anthony Watts, a meteorologist who studies weather stations, found that many temperature-reading stations deemed to be of poor quality [actually have a slight cooling bias](http://thinkprogress.org/romm/2010/01/28/205416/watts-not-to-love-new-study-finds-the-poor-u-s-weather-stations-tend-to-have-a-slight-cool-bias-not-a-warm-one/)), and the fact that a large number of stations have recorded global cooling over the past 70 years.  The study concluded that although the urban heat island effect is real, it does not contribute much to global land temperature rises because urban areas make up less than one percent of total land area. The scientists found that one third of stations reported global cooling, but two thirds show global warming.  "A good determination of the rise in global land temperatures can't be done with just a few stations: it takes hundreds—or better, thousands—of stations to detect and measure the average warming," lead scientist Robert Rohde said in a statement.  The team measured only land temperature data—global ocean temperatures are thought to have warmed less. The team plans on tackling that project next.

## Yes Anthropogenic Warming

#### Warming is anthropogenic and occurring now

**Rahmstorf 8**—Stefan Rahmstorf is Professor of Physics of the Oceans, Potsdam University, Head of Earth System Analysis, PIK , Fellow of the American Geophysical Union, Honorary Fellow of the University of Wales/Bangor , Member of the Academia Europaea, Member of the German Advisory Council on Global Change (WBGU), “Global Warming: Looking Beyond Kyoto”

It is time to turn to statement B: human activities are altering the climate. This can be broken into two parts. The first is as follows: global climate is warming. This is by now a generally undisputed point (except by novelist Michael Crichton), so we deal with it only briefly. The two leading compilations of data measured with thermometers are shown in figure 3-3, that of the National Aeronautics and Space Administration (NASA) and that of the British Hadley Centre for Climate Change. Although they differ in the details, due to the inclusion of different data sets and use of different spatial averaging and quality control procedures, they both show a consistent picture, with a global mean warming of 0.8°C since the late nineteenth century. Temperatures over the past ten years clearly were the warmestsince measured records have been available. The year 1998 sticks out well above the longterm trend due to the occurrence of a major El Nino event that year (the last El Nino so far and one of the strongest on record). These events are examples of the largest natural climate variations on multiyear time scales and, by releasing heat from the ocean, generally cause positive anomalies in global mean temperature. It is remarkable that the year 2005 rivaled the heat of 1998 even though no El Nino event occurred that year. (A bizarre curiosity, perhaps worth mentioning, is that several prominent "climate skeptics" recently used the extreme year 1998 to claim in the media that global warming had ended. In Lindzen's words, "Indeed, the absence of any record breakers during the past seven years is statistical evidence that temperatures are not increasing.")33 In addition to the surface measurements, the more recent portion of the global warming trend (since 1979) is also documented by satellite data. It is not straightforward to derive a reliable surface temperature trend from satellites, as they measure radiation coming from throughout the atmosphere (not just near the surface), including the stratosphere, which has strongly cooled, and the records are not homogeneous' due to the short life span of individual satellites, the problem of orbital decay, observations at different times of day, and drifts in instrument calibration.' Current analyses of these satellite data show trends that are fully consistent with surface measurements and model simulations." If no reliable temperature measurements existed, could we be sure that the climate is warming? The "canaries in the coal mine" of climate change (as glaciologist Lonnie Thompson puts it) ~are mountain glaciers. We know, both from old photographs and from the position of the terminal moraines heaped up by the flowing ice, that mountain glaciers have been in retreat all over the world during the past century. There are precious few exceptions, and they are associated with a strong increase in precipitation or local cooling.36 I have inspected examples of shrinking glaciers myself in field trips to Switzerland, Norway, and New Zealand. As glaciers respond sensitively to temperature changes, data on the extent of glaciers have been used to reconstruct a history of Northern Hemisphere temperature over the past four centuries (see figure 3-4). Cores drilled in tropical glaciers show signs of recent melting that is unprecedented at least throughout the Holocene-the past 10,000 years. Another powerful sign of warming, visible clearly from satellites, is the shrinking Arctic sea ice cover (figure 3-5), which has declined 20 percent since satellite observations began in 1979.While climate clearly became warmer in the twentieth century, much discussion particularly in the popular media has focused on the question of how "unusual" this warming is in a longer-term context. While this is an interesting question, it has often been mixed incorrectly with the question of causation. Scientifically, how unusual recent warming is-say, compared to the past millennium-in itself contains little information about its cause. Even a highly unusual warming could have a natural cause (for example, an exceptional increase in solar activity). And even a warming within the bounds of past natural variations could have a predominantly anthropogenic cause. I come to the question of causation shortly, after briefly visiting the evidence for past natural climate variations. Records from the time before systematic temperature measurements were collected are based on "proxy data," coming from tree rings, ice cores, corals, and other sources.These proxy data are generally linked to local temperatures in some way, but they may be influenced by other parameters as well (for example, precipitation), they may have a seasonal bias (for example, the growth season for tree rings), and high-quality long records are difficult to obtain and therefore few in number and geographic coverage. Therefore, there is still substantial uncertainty in the evolution of past global or hemispheric temperatures. (Comparing only local or regional temperature; as in Europe, is of limited value for our purposes,' as regional variations can be much larger than global ones and can have many regional causes, unrelated to global-scale forcing and climate change.) The first quantitative reconstruction for the Northern Hemisphere temperature of the past millennium, including an error estimation, was presented by Mann, Bradley, and Hughes and rightly highlighted in the 2001 IPCC report as one of the major new findings since its 1995 report; it is shown in figure 3\_6.39 The analysis suggests that, despite the large error bars, twentieth-century warming is indeed highly unusual and probably was unprecedented during the past millennium. This result, presumably because of its symbolic power, has attracted much criticism, to some extent in scientific journals, but even more so in the popular media. The hockey stick-shaped curve became a symbol for the IPCC, .and criticizing this particular data analysis became an avenue for some to question the credibility of the IPCC. Three important things have been overlooked in much of the media coverage. First, even if the scientific critics had been right, this would not have called into question the very cautious conclusion drawn by the IPCC from the reconstruction by Mann, Bradley, and Hughes: "New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the twentieth century is likely to have been the largest of any century during the past 1,000 years." This conclusion has since been supported further by every single one of close to a dozen new reconstructions (two of which are shown in figure 3-6). Second, by far the most serious scientific criticism raised against Mann, Hughes, and Bradley was simply based on a mistake. 40 The prominent paper of von Storch and others, which claimed (based on a model test) that the method of Mann, Bradley, and Hughes systematically underestimated variability, "was [itself] based on incorrect implementation of the reconstruction procedure."41 With correct implementation, climate field reconstruction procedures such as the one used by Mann, Bradley, and Hughes have been shown to perform well in similar model tests. Third, whether their reconstruction is accurate or not has no bearing on policy. If their analysis underestimated past natural climate variability, this would certainly not argue for a smaller climate sensitivity and thus a lesser concern about the consequences of our emissions. Some have argued that, in contrast, it would point to a larger climate sensitivity. While this is a valid point in principle, it does not apply in practice to the climate sensitivity estimates discussed herein or to the range given by IPCC, since these did not use the reconstruction of Mann, Hughes, and Bradley or any other proxy records of the past millennium. Media claims that "a pillar of the Kyoto Protocol" had been called into question were therefore misinformed. As an aside, the protocol was agreed in 1997, before the reconstruction in question even existed. The overheated public debate on this topic has, at least, helped to attract more researchers and funding to this area of paleoclimatology; its methodology has advanced significantly, and a number of new reconstructions have been presented in recent years. While the science has moved forward, the first seminal reconstruction by Mann, Hughes, and Bradley has held up remarkably well, with its main features reproduced by more recent work. Further progress probably will require substantial amounts of new proxy data, rather than further refinement of the statistical techniques pioneered by Mann, Hughes, and Bradley. Developing these data sets will require time and substantial effort. It is time to address the final statement: most of the observed warming over the past fifty years is anthropogenic. A large number of studies exist that have taken different approaches to analyze this issue, which is generally called the "attribution problem." I do not discuss the exact share of the anthropogenic contribution (although this is an interesting question). By "most" I imply mean "more than 50 percent.” The first and crucial piece of evidence is, of course, that the magnitude of the warming is what is expected from the anthropogenic perturbation of the radiation balance, so anthropogenic forcing isable to explain all of the temperature rise.As discussed here, the rise in greenhouse gases alone corresponds to 2.6 W/tn2 of forcing. This by itself, after subtraction of the observed 0'.6 W/m2 of ocean heat uptake, would Cause 1.6°C of warming since preindustrial times for medium climate sensitivity (3"C). With a current "best guess'; aerosol forcing of 1 W/m2, the expected warming is O.8°c. The point here is not that it is possible to obtain the 'exact observed number-this is fortuitous because the amount of aerosol' forcing is still very' uncertain-but that the expected magnitude is roughly right. There can be little doubt that the anthropogenic forcing is large enough to explain most of the warming. Depending on aerosol forcing and climate sensitivity, it could explain a large fraction of the warming, or all of it, or even more warming than has been observed (leaving room for natural processes to counteract some of the warming). The second important piece of evidence is clear: there is no viable alternative explanation. In the scientific literature,no serious alternative hypothesis has been proposed to explain the observed global warming. Other possible causes, such as solar activity, volcanic activity, cosmic rays, or orbital cycles, are well observed, but they do not show trends capable of explaining the observed warming. Since 1978, solar irradiance has been measured directly from satellites and shows the well-known eleven-year solar cycle, but no trend. There are various estimates of solar variability before this time, based on sunspot numbers, solar cycle length, the geomagnetic AA index, neutron monitor data, and, carbon-14 data. These indicate that solar activity probably increased somewhat up to 1940. While there is disagreement about the variation in previous centuries, different authors agree that solar activity did not significantly increase during the last sixty-five years. Therefore, this cannot explain the warming, and neither can any of the other factors mentioned. Models driven by natural factors only, leaving the anthropogenic forcing aside, show a cooling in the second half of the twentieth century (for an example, See figure 2-2, panel a, in chapter 2 of this volume). The trend in the sum of natural forcings is downward. The only way out would be either some as yet undiscovered unknown forcing or a warming trend that arises by chance from an unforced internal variability in the climate system. The latter cannot be completely ruled out, but has to be considered highly unlikely.No evidence in the observed record, proxy data, or current modelssuggest that such internal variability could cause asustained trend of globalwarming of the observed magnitude. As discussed twentieth century warming is unprecedented over the past 1,000 years, (or even 2,000 years, as the few longer reconstructions available now suggest), which does not 'support the idea of large internal fluctuations. Also, those past variations correlate well with past forcing (solar variability, volcanic activity) and thus appear to be largely forced rather than due to unforced internal variability." And indeed, it would be difficult for a large and sustained unforced variability to satisfy the fundamental physical law of energy conservation. Natural internal variability generally shifts heat around different parts of the climate system-for example, the large El Nino event of 1998, which warmed, the atmosphere by releasing heat stored in the ocean. This mechanism implies that the ocean heat content drops as the atmosphere warms. For past decades, as discussed, we observed the atmosphere warming and the ocean heat content increasing, which rules out heat release from the ocean as a cause of surface warming. The heat content of the whole climate system is increasing, and there is no plausible source of this heat other than the heat trapped by greenhouse gases. ' A completely different approach to attribution is to analyze the spatial patterns of climate change. This is done in so-called fingerprint studies, which associate particular patterns or "fingerprints" with different forcings. It is plausible that the pattern of a solar-forced climate change differs from the pattern of a change caused by greenhouse gases. For example, a characteristic of greenhouse gases is that heat is trapped closer to the Earth's surface and that, unlike solar variability, greenhouse gases tend to warm more in winter, and at night. Such studies have useddifferentdata sets and have been performed bydifferent groups of researcherswith different statistical methods. They consistently concludethat the observed spatial pattern of warming can only be explained by greenhouse gases.49 Overall, it has to be considered, highly likely' that the observed warming is indeed predominantly due to the human-caused increase in greenhouse gases. ' This paper discussed the evidence for the anthropogenic increase in atmospheric CO2 concentration and the effect of CO2 on climate, finding that this anthropogenic increase is proven beyond reasonable doubtand that a mass of evidencepoints to a CO2 effect on climate of 3C ± 1.59C global-warming for a doubling of concentration. (This is, the classic IPCC range; my personal assessment is that, in-the light of new studies since the IPCC Third Assessment Report, the uncertainty range can now be narrowed somewhat to 3°C ± 1.0C) This is based on consistent results from theory, models, and data analysis, and, even in the absence-of any computer models, the same result would still hold based on physics and on data from climate history alone. Considering the plethora of consistent evidence, the chance that these conclusions are wrong has to be considered minute. If the preceding is accepted, then it follows logically and incontrovertibly that a further increase in CO2 concentration will lead to further warming. The magnitude of our emissions depends on human behavior, but the climatic response to various emissions scenarios can be computed from the information presented here. The result is the famous range of future global temperature scenarios shown in figure 3\_6.50 Two additional steps are involved in these computations: the consideration of anthropogenic forcings other than CO2 (for example, other greenhouse gases and aerosols) and the computation of concentrations from the emissions. Other gases are not discussed here, although they are important to get quantitatively accurate results. CO2 is the largest and most important forcing. Concerning concentrations, the scenarios shown basically assume that ocean and biosphere take up a similar share of our emitted CO2 as in the past. This could turn out to be an optimistic assumption; some models indicate the possibility of a positive feedback, with the biosphere turning into a carbon source rather than a sink under growing climatic stress. It is clear that even in the more optimistic of the shown (non-mitigation) scenarios, global temperature would rise by 2-3°C above its preindustrial level by the end of this century. Even for a paleoclimatologist like myself, this is an extraordinarily high temperature, which is very likely unprecedented in at least the past 100,000 years. As far as the data show, we would have to go back about 3 million years, to the Pliocene, for comparable temperatures. The rate of this warming (which is important for the ability of ecosystems to cope) is also highly unusual and unprecedented probably for an even longer time. The last major global warming trend occurred when the last great Ice Age ended between 15,000 and 10,000 years ago: this was a warming of about 5°C over 5,000 years, that is, a rate of only 0.1 °C per century. 52 The expected magnitude and rate of planetary warming is highly likely to come with major risk and impacts in terms of sea level rise (Pliocene sea level was 25-35 meters higher than now due to smaller Greenland and Antarctic ice sheets), extreme events (for example, hurricane activity is expected to increase in a warmer climate), and ecosystem loss. The second part of this paper examined the evidence for the current warming of the planet and discussed what is known about its causes. This part showed that global warming is already a measured and well-established fact, not a theory. Many different lines of evidence consistently show that most of the observed warming of the past fifty years was caused by human activity. Above all, this warming is exactly what would be expected given the anthropogenic rise in greenhouse gases, and no viable alternative explanation for this warming has been proposed in the scientific literature. Taken together., the very strong evidenceaccumulated from thousands of independent studies, has over the past decades convinced virtually every climatologist around the world(many of whom were initially quite skeptical, including myself) that anthropogenic global warming is a reality with which we need to deal.

## Action Key

#### Warming is anthropogenic—the potential impacts of warming warrant an action even if science is not certain.

**Pethica et al 10**—Professor John Pethica is the chair of the physical secretary of Royal Society. Ms Fiona Fox

Director, Science Media Centre, UK Sir Brian Hoskins FRS Director Grantham Institute for Climate Change, Imperial College, UK Professor Michael Kelly FRS Professor of Technology, University of Cambridge, UK Professor John Mitchell FRS Director of Climate Science, Met Office, UK Professor Susan Owens Professor of Environment and Policy, University of Cambridge, UK Professor Tim Palmer FRS Royal Society Research Professor, University of Oxford, UK Professor John Shepherd FRS Professorial Research Fellow in Earth System Science, University of Southampton, UK Professor Keith Shine FRS Professor of Physical Meteorology, University of Reading, UK Professor David Spiegelhalter FRS Professor of the Public Understanding of Risk, University of Cambridge, UK, “Climate change: a summary of the science” Sept. 2010 <http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2010/4294972962.pdf> accessed date: 7-15-12 y2k

There is strong evidencethat changesingreenhouse gas concentrations due tohuman activityare the dominant cause of the global warming that has taken place over the last half century. This warming trend is expected to continue as are changes in precipitation over the long term in many regions. Further and more rapid increases in sea level are likely which will haveprofound implications for coastal communities and ecosystems. It is not possible to determine exactly how much the Earth will warm or exactly how the climate will change in the future, but careful estimatesof potentialchanges and associated uncertainties have been made. Scientists continue to work to narrow these areas of uncertainty. Uncertainty can work both ways, since the changes and their impacts may be either smaller or larger than those projected. Like many important decisions, policy choices about climate change have to be made inthe absence of perfect knowledge.Even if the remaining uncertainties were substantially resolved, the wide variety of interests, cultures and beliefs in society would make consensus about such choices difficult to achieve. However, the potential impacts of climate change are sufficiently seriousthat important decisions will need to be made. Climate science – including the substantial body of knowledge that is already well established, and the results of future research – is the essential basis for future climate projections and planning, and must be a vital component of public reasoning in this complex and challenging area

## Warming Impact EXTN

#### Warming causes extinction

Sify 2010 [Sydney newspaper citing Ove Hoegh-Guldberg, professor at University of Queensland and Director of the Global Change Institute, and John Bruno, associate professor of Marine Science at UNC; Sify News, “Could unbridled climate changes lead to human extinction?”, <http://www.sify.com/news/could-unbridled-climate-changes-lead-to-human-extinction-news-international-kgtrOhdaahc.html>]

The findings of the comprehensive report: 'The impact of climate change on the world's marine ecosystems' emerged from a synthesis of recent research on the world's oceans, carried out by two of the world's leading marine scientists. One of the authors of the report is Ove Hoegh-Guldberg, professor at The University of Queensland and the director of its Global Change Institute (GCI). 'We may see sudden, unexpected changes that have serious ramifications for the overall well-being of humans, including the capacity of the planet to support people. This is further evidence that we are well on the way to the next great extinction event,' says Hoegh-Guldberg. 'The findings have enormous implications for mankind, particularly if the trend continues. The earth's ocean, which produces half of the oxygen we breathe and absorbs 30 per cent of human-generated carbon dioxide, is equivalent to its heart and lungs. This study shows worrying signs of ill-health. It's as if the earth has been smoking two packs of cigarettes a day!,' he added. 'We are entering a period in which theocean services upon which humanity depends are undergoing massive change and in some cases beginning to fail', **he added. The 'fundamental and comprehensive' changes to marine life identified in the report include rapidly** warming and acidifying oceans, changes in water circulation and expansion of dead zones within the ocean depths. These are driving major changes in marine ecosystems: **less abundant coral reefs, sea grasses and mangroves (important fish nurseries); fewer, smaller fish; a** breakdown in food chains; changes in the distribution of marine life; and more frequent diseases and pests among marine organisms. Study co-author John F Bruno, associate professor in marine science at The University of North Carolina, says greenhouse gas emissions are modifying many physical and geochemical aspects of the planet's oceans, in ways 'unprecedented in nearly a million years'. 'This **is causing fundamental and comprehensive changes to the way marine ecosystems function,' Bruno warned, according to a GCI release. These findings were published in Science.**

## Econ Impact

#### Warming collapses economy—even a small event could have significant impacts.

**UNEP FI 1**—the United Nations Environment Programme Finance Initiative, “Climate Change and the Financial Services Industry” <http://www.dlc.org/documents/UN_Climate-Change_Study.pdf> Accessed date: 8-7-12 y2k

Climate change poses a major risk to the global economy. The increasingfrequency of severeclimatic events,coupled withsocial trends, has the potential to stress insurers, reinsurers and banks to the point ofimpaired viability or even insolvency. Worldwide economic lossesdue to natural disasters appear to bedoubling every 10 years and, on current trends, annual losses will reach almost $150 billion in the next decade. The greenhouse gases (GHGs) which create this problem are longlived so action is urgently needed. A long-term international political framework for climate stability is essential. The Kyoto Protocol, under which many industrialised nations have pledged to curb their emissions of GHGs by 2012, is an important step but does not go nearly far enough. To ensure future economic development is sustainable, it must be based on the principles of precaution and equity. This will be achieved more quickly, and with less economic dislocation, by harnessing market mechanisms with a skilful blend of policies and measures. The ﬁnancial sector therefore has a key role to play in delivering market solutions to climate change. Examples include GHG emissions trading markets and ﬁnance for clean energy technologies. By some estimates, the former could be a $2 trillion/year market by 2012 while the latter could be worth $1.9 trillion by 2020. Recently issued scientiﬁc reports from the Intergovernmental Panel on Climate Change, among others, have afﬁrmed that most global warming over the past 50 years is attributable to human activities. They have also concluded that: • the climate may warm faster than previously thought; • developing countries are most at risk; and • at some point, sudden and irreversible shifts in global climate patterns may occur.The greenhouse gases (GHGs) which create the problem – of which carbon dioxide is the best known – persist for many decades. To stabilise atmospheric concentrations at just twice the preindustrial level would require current emission levels to be cut by 60%. There is, therefore, a growing sense of urgency to act in a meaningful fashion. Worldwide economic losses due to natural disasters appear to be doubling every ten years and, if current trends persist, annual losses will come close to $150 billion in the next decade. A signiﬁcant portion of this will be insured. The experience of the insurance industry shows that even small changes (< 10%) in event severity can generatemultiple increases in damage. A pro-active stance by ﬁnancial institutions will help to reduce the threats they face from climate change while also providing opportunities (see Table 1).

## Disease Impact

#### Climate change causes deadly disease spread—impact is extinction.

**McMichael et al**, **3-19**-12—Professor of population health, Australia Fellow of National Health and Medical Research Council, Tony, Hugh Montgomery professor of intensive care medicine, director of UCL Institute for Human Health and Performance, Anthony Costello professor of international child health, director of UCL Institute for Global Health, University College London, “Health risks, present and future, from global climate change” <http://www.bmj.com/content/344/bmj.e1359.pdf%2Bhtml> accessed date: 6-1 y2k

Climate change may bring health benefits to some, at least in the early stages of the process. Milder winters (albeit set against a rise in short term weather variability) may reduce deaths from influenza or cardiovascular disease in some temperate countries, while mosquito populations may recede in areas that become more arid. Improved coverage and use of bed nets, management of stagnant water and mosquito breeding sites, and greater availability of effective drugs may also (at a price) offset population risks from malaria vector expansion. The overall balance of health impacts of climate change, however, is anticipated to be substantially, and increasingly, negative. These negative effects are mediated not only through progressive changes in average climatic conditions, as temperatures rise and precipitation patterns change, but also through changes in regional weather patterns or their stability. Unpredictable weather (sudden cold, hot, wet, or dry spells) and extreme weather events (such as heat waves, floods, and droughts) will becomemore common. These climatic changes affect human health through mechanisms that may be direct and indirect, immediate or delayed. Four categories of risk to human health can be described. Immediate and direct risksinclude the primary health impacts of heat waves, extreme weather events, and altered air quality (especiallyincreased concentrations of ground level ozone). The frequency of extreme heat episodes will increase as average temperatures rise, and heat waves and extreme weather events are also expected to become more frequent as climatic conditions become more variable. Ascribing any one particular extreme weather event to climate change is difficult, but scientific confidence has grown that we are already seeing such attributable impacts. For example, it is estimated that climate change has already approximately doubled the probability that a heat wave as severe as the European heat wave in August 2003 will occur again. In November 2011 the Intergovernmental Panel on Climate Change (IPCC) special report on managing the risks of extreme events and disasters suggested that with a scenario of continuing high emissions it is likely that the frequency of heat waves will increase in most regions. Heavy precipitation will occur more often, and the wind speed oftropical cyclones will increase and their number will likely remain constant or decrease. Recent experience of extremes of summerheat in Europe, Asia, and North America has underscoredthe great threat to health when physiological thresholds are passed. Once the human body’s capacity to cope with increased thermal stress is exceeded, risks of homeostatic failure, disease exacerbation, and death begin to rise rapidly. This is especially the case in older people, those with underlying cardiovascular or chronic respiratory disease, and those who are poor, uneducated, or isolated (and therefore less likely to have access to, or take, preventive action). Such effects are exacerbated by changes in air quality: ground level ozone levels rise with temperature, threatening human health. The greater absolute burden of adverse health impact from heat waves will be in the general community, but workers in various heat exposed workplaces, both outdoors and indoors (if unventilated), are particularly vulnerable. Societies will be hard pressed to prepare for and cope with extreme weather events, especially when these occur on a large scale. The flooding in Pakistan in July 2010 left 160 000 km (or 62 000 square miles, a fifth of the country’s land mass) under water. 2010 also saw the hottest summer in Russia for 130 years, leading to forest and grassland fires burning a similar area, contributing to many deaths, and damaging grain crops. Changes in climatic conditions will affect many climate sensitive infectious diseases, via influences on pathogen maturation and multiplication, on vector organism density and behaviour (such as the mosquito), on the ecology and density of reservoir (intermediate) host species, and on aspects of human behaviour that amplify risks of infection (such as crowding and displacement). Thus, cases of campylo bacteriosis, and infection with Salmonella Typhimurium and Salmonella Enteritidis rise with temperature. Such risks may be offset in countries with sufficient resources, but this may not be the case elsewhere. Changes in the distribution and life cycle of vector organisms will also occur, as will those of their transmitted pathogens. Changes in Lyme disease, malaria, schistosomiasis, trypanosomiasis, onchocerciasis, and leishmaniasis are to be expected, as well as in dengue fever and infections by other arboviruses. The geographical distribution and timing of such changes are difficult to predict. For example, a short term increase in temperature and rainfall associated with the 1997-98 El Niño caused Plasmodium falciparum malaria epidemics in Kenya, but reduced malaria transmission in Tanzania. Malarial zones have apparently extended to higher altitude in western Kenyan highlands ; the schistosomiasis water snail survival zone has extended north in eastern China ; tick borne encephalitis zones have expanded northwards in Sweden; and the ixodid tick, which transmits Lyme disease, has spread northward in eastern Canada. Taken together, these observations suggest that such impacts of climate change may already be taking place. Surface runoff and solid material transportation (for instance, of organic materials) result from heavy rainfall, which is likely to rise in frequency in temperate countries as climate change progresses. Increased water contamination (both particulate and microbial, including from sewerage effluent) is thus likely.Gains in temperature and changes in rainfall and humidity may extend and intensify exposure to allergenic pollen and spores from plants such as ragweed…

Climate change poses a grave threat to human health and survival and urgent and substantial efforts to limit greenhouse gas emissions (that is, mitigation) are essential. Meanwhile, public health action is needed to manage those risks already with us, or that will result from the locked in, but as yet latent, warming from past emissions (estimated at ≥0.7°C).

# Solvency

## Incentives Solve

#### Incentives are key to spur private sector investment of OTEC

US Department of Energy 5 [“Ocean Thermal Energy Conversion,” 9/12/05, <http://www.eere.energy.gov/consumer/renewable_energy/ocean/index.cfm/mytopic=50010>]

In general, careful site selection is the key to keeping the environmental impacts of OTEC to a minimum. OTEC experts believe that appropriate spacing of plants throughout the tropical oceans can nearly eliminate any potential negative impacts of OTEC processes on ocean temperatures and on marine life. OTEC power plants require substantial capital investment upfront. OTEC researchers believe private sector firms probably will be unwilling to make the enormous initial investment required to build large-scale plants until the price of fossil fuels increases dramatically or until national governments provide financial incentives. Another factor hindering the commercialization of OTEC is that there are only a few hundred land-based sites in the tropics where deep-ocean water is close enough to shore to make OTEC plants feasible.

#### OTEC isn’t being invested in now because of high startup costs

Daniel 2k [Thomas H. Daniel, Ph.D, The Natural energy Laboratory of Hawaii Authority, 1/2000, “Ocean Thermal Energy Conversion (OTEC)” UN Atlas of the Oceans”]

OTEC has tremendous potential to supply the world’s energy . This potential is estimated to be about 1013 watts of baseload power generation [20]. However, OTEC systems must overcome the significant hurdle of high initial capital costs for construction and the perception of significant risk compared to conventional fossil fuel plants. These obstacles can be overcome only by progressing beyond the present experimental testing and evaluation of small-scale demonstration plants to the construction of pilot-sized and, eventually, commerical-sized plants to demonstrate economic feasibility. As a UN Development Program study determined, the confidence to build commercial-sized OTEC plants will not develop until investors have the demonstration of a 5-megawatt pilot plant operating for 5 years. This demonstration will require a significant investment with little potential near-term return. For the near-term future development of OTEC systems, isolated niche markets with high conventional energy costs and a need for energy independence may provide a viable venue for market penetration in the size range of 1 MW to 15 MW. These may provide the demonstration required for penetration into larger markets where economically competitive plants of 50 - 400 MW will be viable

#### Funding key to solve—the financial sector is ready

World Energy Council 8 [World Energy Council, Don Lennard “Survey of Energy Resources 2007: The Way Ahead and the Market” 2008, http://www.worldenergy.org/publications/survey\_of\_energy\_resources\_2007/ocean\_thermal\_energy\_conversion/771.asp]

As with most new technologies, the financial sector is slow to involve itself until one or more representative demonstration plants have operated successfully - and this has proved to be true in the past for OTEC technology. However, with the progressive reduction in risks - for example the mooring of a floating OTEC plant will now be an application of 'routine' offshore oil and gas experience - a number of more enlightened financial bodies are now prepared to become involved at this relatively early stage of development. Other funding sources would include agencies such as the World Bank or European Development Bank and a further potential source of funding is possible through the Lomé and Cotonou Agreements between the European Union and the Africa-Caribbean-Pacific (ACP) States, many of which are prime candidates to use OTEC power. In Europe both the European Commission and the industrially-based Maritime Industries Forum examined OTEC opportunities with relevance to DOWA in general rather than just OTEC, and the UK published its Foresight document for the marine sector, looking five to twenty years ahead, and both OTEC and DOWA were included in the energy section of the paper. It is significant that the emphasis in the recommendations from all three European groupings has, again, been on the funding and construction of a plant in the 5-10 MW range. Current US activity is concentrating on an Indian Ocean island site, and it is perhaps noteworthy that both Japanese and British evaluations continue to identify Fijian prime sites, one each on the two largest islands of that country. The worldwide market for all renewables has been estimated for the timescales from 1990 to 2020 and 2050, with three scenarios and, not surprisingly, all show significant growth. Within those total renewable figures, opportunities exist for the construction of a significant amount of OTEC capacity, even though OTEC may account for only a small percentage of total global electricity generating capacity for some years.  Estimates have been made by French, Japanese, British and American workers in the field, suggesting worldwide installed power for up to a thousand OTEC plants by the year 2010, of which 50% would be no larger than 10 MW, and less than 10% would be of 100 MW size. On longer timescales, the demand for OTEC in the Asia/Pacific region has been estimated at 20 GW in 2020 and 100 GW in 2050 (OECD, 1999). It has to be said that some of these numbers seem optimistic, with realisation depending on the successful operation of a number of demonstrator plants at an early date. In summary, however, it can realistically be claimed that the economic commercialisation of OTEC/DOWA is 'now' - nearly all the technology is established, and the greatest concentration of effort seems logically to be aimed at lining up an increased range of suitable funding sources.

## Has Tech

#### OTEC is feasible, economically viable, and new tech solves

McCallister and McLaughlin 2012 [Captain Michael, Senior Engineer with Sound and Sea Technology, Commander Steve, Critical Infrastructure Programs Manager at Sound and Sea Technology, January, "Renewable Energy from the Ocean", U.S. Naval Institute Proceedings, Vol. 138, Issue 1, EBSCO]

The well-known OTEC operating principles date to the original concept proposed by Jacques-Arséne d'Arsonval in 1881. OTEC recovers solar energy using a thermodynamic cycle that operates across the temperature difference between warm surface water and cold deep water. In the tropics, surface waters are above 80 degrees Fahrenheit, while at depths of about 1,000 meters water temperatures are just above freezing. This gradient provides a differential that can be used to transfer energy from the warm surface waters and generate electricity. For a system operating between 85 and 35 degrees Fahrenheit, the temperature differential yields a maximum thermodynamic Carnot cycle efficiency of 9.2 percent. Although this is considered low efficiency for a power plant, the "fuel" is free. Hence, the real challenge is to build commercial-scale plants that yield competitively priced electricity. [Overcoming Barriers](http://web.ebscohost.com.proxy.foley.gonzaga.edu/ehost/detail?sid=87890f06-f7e4-4e29-8195-f799789d6cb3%40sessionmgr12&vid=4&hid=7&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#toc)  Previous attempts to develop a viable and practical OTEC commercial power system suffered from several challenges. The low temperature delta requires large seawater flows to yield utility scale outputs. Therefore, OTEC plants must be large. Thus, they will also be capital-intensive. As plant capacity increases, the unit outlay becomes more cost-effective due to economy of scale. Survivable cold-water pipes, cost-efficient heat exchangers, and to a lesser extent offshore structures and deep-water moorings represent key technical challenges. However, developments in offshore technologies, new materials, and fabrication and construction processes that were not available when the first serious experimental platforms were developed in the 1970s now provide solutions. When located close to shore, an OTEC plant can transmit power directly to the local grid via undersea cable. Plants farther from shore can also produce power in the form of energy carriers like hydrogen or ammonia, which can be used both as fuel for transportation and to generate power ashore. In agricultural markets, reasonably priced, renewable-based ammonia can displace natural gas in fertilizer production. Combined with marine algae aqua-culture programs, OTEC plants can also produce carbon-based synthetic fuels. OTEC facilities can be configured to produce fresh water, and, from a military perspective, system platforms can also serve as supply bases and surveillance sites. [Facing Reality](http://web.ebscohost.com.proxy.foley.gonzaga.edu/ehost/detail?sid=87890f06-f7e4-4e29-8195-f799789d6cb3%40sessionmgr12&vid=4&hid=7&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#toc)  Availability of relatively "cheap" fossil fuels limits societal incentives to change and makes energy markets difficult to penetrate. However, the realization of "peak oil" (the theoretical upper limit of global oil production based on known reserves), ongoing instability in Middle East political conditions, adversarial oil-supply partners, and concerns over greenhouse-gas buildup and global warming all contribute to the need for renewable energy solutions. An assessment of OTEC technical readiness by experts at a 2009 National Oceanic and Atmospheric Administration workshop indicated that a 10 megawatt (MW) floating OTEC facility is technically feasible today, using current design, manufacturing, and installation technologies. While readiness and scalability for a 100 MW facility were less clear, the conclusion was that experience gained during the construction, deployment, and operation of a smaller pilot plant would be a necessary step in OTEC commercialization. The Navy now supports the development of OTEC, with the goal of reducing technical risks associated with commercialization.

#### Yes tech- has been tested and proven viable in nearly 100 different countries around the world and the technology exists now

IRENA 2014 [The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. OCEAN THERMAL ENERGY CONVERSION TECHNOLOGY BRIEF http://www.irena.org/DocumentDownloads/Publications/Ocean\_Thermal\_Energy\_V4\_web.pdf

Potential and Barriers – OTEC has the highest potential when comparing all ocean energy technologies, and as many as 98 nations and territories have been identified that have viable OTEC resources in their exclusive economic zones. Recent studies suggest that total worldwide power generation capac - ity could be supplied by OTEC, and that this would have no impact on the ocean’s temperature profiles. Furthermore, a large number of island states in the Caribbean and Pacific Ocean have OTEC resources within 10 kilometres (km) of their shores. OTEC seems especially suitable and economically viable for remote islands in tropical seas where generation can be combined with other functions e.g ., air-conditioning and fresh water production

#### The technology exists and expanded development of OTEC is key to develop desaliniation plants

Cross 2013 [Martin, Translator, former chef and marketeer, currently disabled. I write articles on food,, travel, politics, religion and technology. How an ocean thermal energy conversion (OTEC) plant works <https://suite.io/martin-cross/67sw266>

The ocean as a heat source for power generation The Sun warms the surface of the ocean in the Tropics to a consistent 20-25°C, compared to the temperature of 5°C in the ocean depths (below 1000m). A heat engine can be used to harness this temperature differential to generate electricity. The temperature differences are small and plant efficiency is low but the resource is available 24/7 and therefore capable of providing continuous base load electricity without the logistical nightmare that providing power to remote tropical communities can entail. The technology is currently only capable of producing significant amounts of electrical power in the Tropics but potentially could offer significantly more energy than options in the temperate zones such as wave and tidal power. For tropical islands where space is at a premium, and coastal areas remote from major power generating plants, an OTEC plant could represent the simplest and most sustainable method of providing their power requirements. The host of ancillary products offered by the process can greatly reduce potential amortization periods and the large volumes of desalinated water produced in the open-cycle and hybrid configurations could enable these installations to be readily adapted to use primarily as desalination plants and hydrogen generation plants. An OTEC plant – an enormous heat engine A heat engine is a means of using heat to provide useful work. A domestic refrigerator and an air conditioning unit are both forms of heat engine, moving heat from an area required to be cold and releasing it to the ambient air. In an OTEC plant, a fluid is forced to vaporize to drive a low-pressure turbine generator system. In a closed cycle plant, the working fluid is usually a refrigerant with a low boiling point, such as ammonia. In an open cycle plant, the seawater itself is used as the working fluid. The two cycles can also be combined in a hybrid plant. Cold seawater from more than a kilometre deep in the ocean is an essential part of a standard OTEC plant. This can be pumped up but the long stretches of pressure piping required can prove expensive: alternatives are to desalinate the seawater near to the seafloor (which lowers its density) and allow it to rise naturally to the surface or, in a closed cycle, to pump vaporized refrigerant down into the depths to be condensed, thereby reducing the pumping volumes required and saving costs. The plants produce large quantities of cold water available as a by-product, which can be used for local air conditioning, speciality fish-farming and other forms of aquaculture. Open-cycle and hybrid plants can also supply fresh distilled water, which can be used for domestic purposes or industrially to produce hydrogen for fuel cells for a hydrogen economy. These, and other by-products, can be used to reduce operating costs and provide additional benefits to the local community.

#### OTEC is feasible and the tech exists now

Martí et al 2010[ José A. is president of Offshore Infrastructure Associates, with offices in San Juan, Puerto Rico, and Scotch Plains, New Jersey. He is a licensed professional engineer and planner, a diplomate of the American Academies of Environmental and Water Resources Engineers and has more than 30 years of experience.. Manuel A.J. Laboy is vice president and director of Offshore Infrastructure Associates. He holds a bachelor’s degree in chemical engineering and a master’s of business administration, and he is a licensed professional engineer. He has extensive experience in process design, construction and plant operations. Dr. Orlando E. Ruiz is an assistant professor at the University of Puerto Rico, Mayaguez, and a director of Offshore Infrastructure Associates. He received a Ph.D. in mechanical engineering from the Georgia Institute of Technology and also completed the General Electric Edison Engineering Development Program. He has worked with aerospace and computer companies and maintains a consulting practice. Commercial Implementation Of Ocean Thermal Energy Conversion Using the Ocean for Commercial Generation Of Baseload Renewable Energy and Potable Water https://www.sea-technology.com/features/2010/0410/thermal\_energy\_conversion.html

Technical Feasibility The nearly 80 years of studies and designs since Claude’s first attempt to demonstrate OTEC technology in Cuba in 1930 and the investment of more than $500 million in R&D and engineering during the mid-1970s to the early 1990s—in the United States alone—have provided sufficient data to build commercial-scale OTEC plants at the present time, given the proper economic conditions and the right markets. In 1980, a report prepared by the RAND Corp. (Santa Monica, California) for the U.S. Department of Energy found that power systems and platforms required for OTEC plants were within the state of the art. Subsequent work, such as designs developed by APL in 1980 and GE in 1983, addressed other issues like the cold-water pipe and the cable used to transport electricity to shore. Substantial additional progress has occurred since then. For example, submarine cables capable of serving the needs of OTEC plants have been developed and are in use for other applications. Techniques for fabricating and installing large-diameter pipes and immersed tubes developed for other applications, such as offshore oil, ocean outfalls and channel crossings, are adaptable to OTEC. The APL and GE designs, as well as the one developed in 1994 by the Tokyo Electric Power Services Co. for its 10-megawatt-electrical closed-cycle plant to serve the Republic of Nauru, are all based on the use of commercially available components and techniques. Offshore Infrastructure Associates Inc. (OIA) has developed configurations for commercial-scale OTEC plants based on available technologies in widespread use for other applications. In addition to general design, work has centered on process optimization and system integration, with the dual objectives of minimizing parasitic power consumption and reducing overall capital cost. Suppliers for plant components have been identified. In summary, OIA has verified conclusions reached by previous investigators: Commercial OTEC plants are technically feasible today.

## Commercializes

#### Government support key to legitimizing investment in OTEC

Friedman 6 [Becca Friedman “Examining the future of Ocean Thermal Energy Conversion: [An Alternative Source Heats Up](http://hprsite.squarespace.com/an-alternative-source-heats-up/2006/2/26/an-alternative-source-heats-up.html)” Febuary 26th 2006 http://hprsite.squarespace.com/an-alternative-source-heats-up/]

Although it may seem like an environmentalist’s fantasy, experts in oceanic energy contend that the technology to provide a truly infinite source of power to the United States already exists in the form of Ocean Thermal Energy Conversion (OTEC). Despite enthusiastic projections and promising prototypes, however, a lack of governmental support and the need for risky capital investment have stalled OTEC in its research and development phase.

#### OTEC has commercial value and development currently and is useable

Martí et al 2010[ José A. is president of Offshore Infrastructure Associates, with offices in San Juan, Puerto Rico, and Scotch Plains, New Jersey. He is a licensed professional engineer and planner, a diplomate of the American Academies of Environmental and Water Resources Engineers and has more than 30 years of experience.. Manuel A.J. Laboy is vice president and director of Offshore Infrastructure Associates. He holds a bachelor’s degree in chemical engineering and a master’s of business administration, and he is a licensed professional engineer. He has extensive experience in process design, construction and plant operations. Dr. Orlando E. Ruiz is an assistant professor at the University of Puerto Rico, Mayaguez, and a director of Offshore Infrastructure Associates. He received a Ph.D. in mechanical engineering from the Georgia Institute of Technology and also completed the General Electric Edison Engineering Development Program. He has worked with aerospace and computer companies and maintains a consulting practice. Commercial Implementation Of Ocean Thermal Energy Conversion Using the Ocean for Commercial Generation Of Baseload Renewable Energy and Potable Water https://www.sea-technology.com/features/2010/0410/thermal\_energy\_conversion.html

Commercial Implementation When OTEC is compared to other energy technologies, three basic aspects must be considered. One is capacity factor. OTEC generates power continuously, with an estimated capacity factor of 85 percent or more, comparable only to combustibles and nuclear power. Capacity factors of other renewable technologies are typically in the 25 to 40 percent range. Even conventional hydropower seldom has capacity factors of more than 60 percent, due to flow variations. The second important aspect is that OTEC does not require any fuel. Energy is generated from purely local sources. This makes it attractive to locations that depend on imported fuels, which are highly vulnerable to volatility in prices and to events affecting world energy markets. The third important aspect is environmental. OTEC does not generate emissions of conventional air pollutants, uses no nuclear materials, does not generate solid or toxic wastes and produces effluents similar to the water it receives. The environmental impacts of OTEC are much lower than those of most technologies capable of baseload power generation. The overall impact of these aspects is that OTEC is a realistic option for many locations that presently rely on fossil fuels for their energy needs. Still, for the technology to be commercially viable, plant output must be sold at prices that will cover costs and provide a reasonable return to investors. Economic viability is the key to OTEC commercialization. Commercial viability depends on a number of conditions. First, technologies capable of producing baseline power at a lower cost than OTEC must not be available in the proposed location. In addition, the thermal resource must be present on a continuous basis (i.e., the temperature gradient must be equal to or greater than 20° C throughout the year) and located relatively close to shore. Finally, there must be a market for the output of the plant. These conditions occur in developed locations that presently consume large amounts of power from fossil fuels, such as Puerto Rico and Hawaii, and also in other locations, such as smaller Caribbean and Pacific islands. OIA estimates that power from an OTEC plant can be sold to consumers at $0.18 per kilowatt-hour or less. More importantly, the price will be stable. For comparison purposes, the average price of electricity in Hawaii in October 2009 was $0.2357 per kilowatt-hour, and it had reached levels as high as $0.3228 per kilowatt-hour the previous October due to record high oil prices in the preceding months. In locations such as smaller Caribbean or Pacific islands that presently use small diesel plants for power—and that rely on desalination for potable water production—the economics of OTEC are even more attractive. If renewable energy credits or other incentives are available, the economics of OTEC could be even more favorable in these areas and perhaps beyond. In addition, there would be significant benefits to the environment, since the air pollutants and greenhouse gases resulting from fuel combustion would not occur.

#### The technology is ready- commercialization key to solve

Nai-kuang 5 [Liang Nai-kuang Taipei Times “Let's tap the power of the sea for our electricity” Sunday, Aug 28, 2005, http://www.taipeitimes.com/News/editorials/archives/2005/08/28/2003269492]

The technologies required by ocean thermal energy conversion already exist, and they only have to be adopted for ocean use**.** The ocean environment, however, is special, and research power plants are small in scale, so the cost of current facilities remains far higher than for other types of power plants. OTEC power plants, however, do not require fuel, nor do they produce pollution. In a long term perspective, fuel prices are bound to go up and environmental pressures will also increase. If the technology involved is improved, commercial OTEC power plants will become the trend of the future; but only by commercialization will OTEC succeed. Preliminarily, the government could provide appropriate funds which businesses could apply for by submitting plans to develop and introduce individual essential technologies, while pilot plants only would be built when the time is ripe. Businesses would be guaranteed their operational rights. Because auxiliary funds would be required, businesses should make cautious estimates and do everything they can to overcome any problems.

#### OTEC has empirically been proven to work- only more funding is needed to sustain development

The Honolulu Advertiser 6 [“OTEC’S future has roadblocks”, 3-31-06, Letters and Commentary, lexis, KAPUSTINA]

A second proven type of OTEC system was not mentioned in the letter. In an open-cycle OTEC, warm surface-level ocean water is boiled to steam using a large vacuum chamber. A large pipe to bring up cold, nutrient-rich ocean water is still needed to provide the temperature difference that allows electrical energy production. The Natural Energy Lab of Hawai'i Authority has not expanded into electrical production because of a relatively small budget and the lack of a large deep-ocean-source pipe for the larger volumes of very cold ocean water needed. A French experiment in the 1950s in Africa made the local fishermen very happy, as a multiplication of their fish population - spurred on by the continuous discharge of the slightly warmed, nutrient-rich deep-ocean water nearby - was an unintended surprise**.** Once we really do get serious about open-cycle OTEC again, we could also make use of the huge volumes of distilled seawater that would be produced as a byproduct**.** Our federal and state governments should do much more to support this important technology, which has the potential to help feed our world while providing needed electrical power, as well as a new type of cold-water-based air-conditioning (now being planned for downtown Honolulu**).** If OTEC finally gets realistic funding, it will begin to reverse the global warming trend that generated some really nasty, city-destroying hurricanes last year and too much rain recently.

## Cost Effective

#### New tech makes OTEC cost competitive

Ferris 2012 [David, Forbes Staff, March 31, "Market for Deep Ocean Energy Heats Up", <http://www.forbes.com/sites/davidferris/2012/03/31/market-for-deep-ocean-energy-starts-to-heat-up/>]

Scientists have entertained the idea of OTEC since the 19th Century and Lockheed Martin created a working model during the 1970s energy crisis . But the budding market withered in the 1980s as fuel prices dropped. Now, with energy prices rising again, OTEC is back. Ted Johnson, a veteran of some early Lockheed experiments, is a senior vice president at OTE Corporation. Johnson told me that OTEC systems are becoming cost competitive because the technology for pipes, heat exchangers and other equipment has improved greatly, thanks in part to innovations by the oil and gas industry. Meanwhile, creating electricity on remote islands is expensive as ever.

#### Production of other byproducts resolve energy costs for both the consumer and the OTEC plants themselves

IRENA 2014 [The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. OCEAN THERMAL ENERGY CONVERSION TECHNOLOGY BRIEF http://www.irena.org/DocumentDownloads/Publications/Ocean\_Thermal\_Energy\_V4\_web.pdf

Performance and Costs – OTEC provides electricity on a continuous (non- intermittent) basis and has a high capacity factor (around 90%). Although, small-scale applications have been tested and demonstrated since the late 1970s, most components have already been tested and are commercially available in the offshore industry. There are considerable economies of scale. Small scale OTEC plants (<10 MW) have high overheads and installation costs lie between USD 2010 16 400 and USD 35 400 per kilowatt (kW). These small-scale OTEC plants can be scaled to accommodate the electricity production of small communities (5000 - 50 000 residents), but would require the production of valuable by-products – like fresh water or cooling – to be economically viable. For island states with electricity prices of USD 0.30 per kilowatt-hour (/kWh), OTEC can be an economically attractive option if the high up-front costs can be secured through loans with low interest rates. The estimated costs – based on feasibility studies – for larger scale installed OTEC plants range between USD 2010 5 000-15 000/kW, and the costs for large scale floating OTEC plants could be as low as USD 2010 2500/kW that results in a levelised cost of electricity of around USD 0.07-0.19/kWh. These cost estimates are highly dependent on the financing options. Furthermore, these cost projections require large-scale deployment and a steep learning curve for OTEC deployment costs

#### Generates other services to reduce costs

CreativeWorld9 2011 [“ADITYA(right) & PRAKASH (left)”. We have completed B.tech in Electronics and Communication Engineering (E.C.E).we are residing at Vishakhapatnam,A.P.we have designed this website with aim of helping the students of Engineering and all graduate fields..This blog contains mainly “IEEE abstracts with full papers in all respective fieldsOCEAN THERMAL ENERGY CONVERSION <http://www.creativeworld9.com/2011/03/abstract-and-full-paper-on-ocean.html>

VII. APPLICATIONS Ocean thermal energy conversion (OTEC) systems have many applications or uses. OTEC can be used to generate electricity, desalinate water, support deep-water Mari culture, and provide refrigeration and air-conditioning as well as aid in crop growth and mineral extraction. These complementary products make OTEC systems attractive to industry and island communities even if the price of oil remains low. The electricity produced by the system can be delivered to a utility grid or used to manufacture methanol, hydrogen, refined metals, ammonia, and similar products. The cold [5°C (41ºF)] seawater made available by an OTEC system creates an opportunity to provide large amounts of cooling to operations that are related to or close to the plant. Likewise, the low-cost refrigeration provided by the cold seawater can be used to upgrade or maintain the quality of indigenous fish, which tend to deteriorate quickly in warm tropical regions. The developments in other technologies (especially materials sciences) were improving the viability of mineral extraction processes that employ ocean energy. ECONOMIC CONSIDERATIONS: The economics of energy production today have delayed the financing of a permanent, continuously operating OTEC plant. However, OTEC is very promising as an alternative energy resource for tropical island communities that rely heavily on imported fuel. OTEC plants in these markets could provide islanders with much-needed power, as well as desalinated water and a variety of Mari culture products. In considering the economics of OTEC, it is appropriate to determine if multiple-product systems, e.g., electricity, desalinated water, Mari culture, and air conditioning (AC) systems yield higher value by, for example, decreasing the equivalent cost of electricity. Because Mari culture operations, as in the case of AC systems, can only use a relatively minute amount of the seawater required for the thermal plants they should be evaluated independent of OTEC. It is recommended that OTEC be considered for its potential impact in the production of electricity and desalinated water and that Mari culture and AC systems, based in the use of deep ocean water, be considered decoupled from OTEC. Comparing production costs of electricity and desalinated water can identify scenarios under which OTEC should be economical, relative to conventional technologies.

#### OTEC has funding available now

Coxworth 2010 [Ben, An experienced freelance writer, videographer and television producer,More funds for Hawaii's Ocean Thermal Energy Conversion plant <http://www.gizmag.com/lockheed-martin-otec-hawaii/17081/>

An Ocean Thermal Energy Conversion (OTEC) pilot plant off the coast of Hawaii’s Big Island is now a step closer to reality. The U.S. Naval Facilities Engineering Command (NFEC) has just awarded Lockheed Martin a US$4.4 million contract modification to develop critical system components and designs for the plant – this amount is in addition to the $8.1 million contract the NFEC issued in 2009, as well as two grants totaling $1 million that Lockheed Martin received from the U.S. Department of Energy in 2008 and this March. Hopefully, this means the streets of Kona may someday be lit by electricity obtained from the temperature difference between warm and cold sea water.

## Plan Modeled

#### Plan sets the US as a leader in OTEC developed – Gets modeled globally

Moore 2006 [Bill, citing Dr. Hans Krock, founder of OCEES, April 12, "OTEC Resurfaces", http://www.evworld.com/article.cfm?storyid=1008]

"The United States is the best placed of any country in the world to do this," he contends. "The United States is the only country in the world of any size whose budget for its navy is bigger than the budget for its army." ¶ It's his contention that this will enable America to assume a leadership position in OTEC technology, allowing it to deploy plants in the Atlantic, Caribbean and Pacific, but he offers a warming.¶ "If we are stupid enough not to take advantage of this, well then this will be China's century and not the American century."¶ Krock is currently negotiating with the U.S. Navy to deploy first working OTEC plant offshore of a British-controlled island in the Indian Ocean -- most likely Diego Garcia though he wouldn't confirm this for security purposes.¶ He is also working with firms in Britain and Netherlands and will be headed to China for talks with the government in Beijing.¶ "The Chinese know very well that they cannot build there futures on oil," he stated, noting that China's is investing large sums of money in a blue water navy. "The United States will be playing catch-up in this technology. We're here. We're willing to do it. We're doing it with the Navy." He expects to put his first plant to sea sometime in 2008 after constructing it, mostly likely, in Singapore.¶ "We simply have to look at the all the alternatives [to conventional fossil fuels and nuclear power] and this is, hands down, the only alternative that's big enough to replace oil."

## A2: OTEC Harms Environment

#### OTEC doesn’t hurt the environment – water output offsets harm to marine life

Dworsky 6 [Rick, Member of environmental conservation and energy issues board for over 30 years in government and private industry. “A Warm Bath of Energy -- Ocean Thermal Energy Conversion,” The Oildrum, June 5 <http://www.theoildrum.com/story/2006/6/5/171056/6460>]

At this time OTEC appears to offer an environmentally neutral energy source. The intermittent injection of minimal amounts of chlorine to prevent bio-fouling of the warm water intakes, and the leaching of metal particles and other materials via erosion/corrosion would probably be environmentally insignificant. Large storage tanks for chlorine would not be necessary - small amounts could be generated 'live' as required to manage the danger to personnel. No bio-fouling within the cold water intake tube has occurred. Although a 100% kill rate for small organisms such as phytoplankton that get drawn into the warm water intakes is probably inevitable, it is believed that this can be mitigated by the pumped 'upwelling' of cold deep fertile waters and the outfall effluent. Only extensive monitoring of an installed mid-size test facility can enable a comprehensive environmental assessment, and find the balance point between bloom and bust. Adjustments of the outfall depth may be necessary, according to local conditions. It may well be the case that OTEC can target some of the energy that causes damaging and catastrophic storms and redirect it into useful work, if large mobile floating platforms become a reality. We should carefully consider when a location can host the process and remain within it's normal temperature gradient range, this would be similar to concerns about the energy absorption effects of solar panels and windmills. OTEC appears to be a vast, renewable, sustainable, safe, 'always on' energy source that does not emit CO2 or nuclear waste.

#### OTEC Plants are clean and don’t damage the environment

Cross 2013 [Martin, Translator, former chef and marketeer, currently disabled. I write articles on food,, travel, politics, religion and technology. How an ocean thermal energy conversion (OTEC) plant works <https://suite.io/martin-cross/67sw266>

OTEC technology has the potential to produce vast amounts of zero-carbon electrical power. The potential hydrogen production could completely replace all fossil fuel consumption with the exception of lubricants. The technology even makes it feasible to mine the sea for minerals and metals. Reduction of costs is still a concern but the technology is effectively still in its infancy and, as with all currently used technologies, ongoing research and experience will produce advances that will reduce costs considerably. The advantages of OTEC technology are that the power source is constantly available, essentially inexhaustible, creates no significant pollution, provides significant useful by-products, is relatively easy to maintain and has a long service life with no inconvenient waste products such as ash, clinker or nuclear waste, requiring disposal or specialized storage. Plants can be land-based, offshore (similar to oil platforms) or even floating.

## A2: Solar Fails/Solar Bad/Etc.

#### OTEC distinct from solar

Choi, 8 - Date: 12 December 2008 The Energy Debates: Ocean Thermal Energy Conversion <http://www.livescience.com/3155-energy-debates-ocean-thermal-energy-conversion.html>

Ocean thermal energy conversion relies on the fact that water near the surface is heated by sunlight while seawater deep in the dark is much colder. OTEC plants use warm surface water to heat ammonia or some other fluid that boils at a low temperature. The resulting gas is used to drive turbines that produce electricity. The gas is then cooled by cold water pumped up from the ocean depths and the resulting fluid is recycled to help generate power.¶ As OTEC relies on temperature differences, it works best in the tropics, where the surface water is hottest. As long as the temperature of surface water and the deep water differs by roughly 36 degrees Fahrenheit (20 degrees Celsius), an OTEC system can generate significant amounts of power.¶ The idea for ocean thermal energy conversion was originally proposed in 1881 by French physicist Jacques-Arsene d'Arsonval. The first OTEC plant was later built in Cuba in 1930 and produced 22 kilowatts of power, enough to supply roughly two typical modern households. Although a handful of OTEC plants were created following the oil crisis of the 1970s, funding for them dwindled after the price of oil dropped, and none are now operating.¶ Still, rising fuel costs have revived interest in these devices. In September the U.S. Department of Energy awarded its first grant for OTEC in years.¶ Pros¶ If less than one-tenth of 1 percent of all the solar energy trapped in the oceans could be converted into electric power , it would supply more than 20 times the total electricity the United States consumes everyday, according to the National Renewable Energy Laboratory. "It could easily supply all the energy we wanted," said Terry Penney, a lab program manager at the National Renewable Energy Laboratory in Golden, Colo. "The process is very low efficiency, just 2 or 3 or 4 percent, but all that energy's free."¶ Unlike wind and solar power, OTEC can provide constant power that utilities can depend on any time of day. The electricity it produces could also be used to drive chemical reactions that generate fuel such as hydrogen, ammonia or methanol, Penney added. It might especially benefit island communities or military outposts that rely heavily on imported fuel.

## A2: Storms

#### Storms won’t affect the plants

Moore 2006 [Bill, citing Dr. Hans Krock, founder of OCEES, April 12, "OTEC Resurfaces", <http://www.evworld.com/article.cfm?storyid=1008>]

As to the question of tropical storms like typhoons or hurricanes and the risk they might pose for offshore OTEC platforms, he explained that these storms form outside of a tropical zone which extends approximately 4-5 degrees above and below the equator. Platforms operating within this narrower belt won't have to worry about these powerful storms and the damage they might cause, though he does plan to engineer for such contingencies.¶ Unlike the illustration above that uses propellers to drive the plant, Krock's concept for moving the "grazing" OTEC mini-islands would rely on two intriguing systems: thrust vectoring and ocean current "sails". An OTEC plant generates a great deal of thrust from the uptake and expulsion of seawater, which can be directed to gradually move the platform in a desired direction. The 1000-feet stand pipe below the plant is like an inverted mast on a sailing ship. Sensors can detect the direction of the current at various depths, allowing the deployment of underwater "sails" that could also be used to passively steer the plant.¶ "There is nothing better than working with nature," Krock commented. "This is simply a model on a human scale of the world's hydrological cycle." When compared to other renewable energy sources such as wind and biomass, he calls the heat energy stored in the ocean as the "elephant in the room".

## A2: Terrorism Turns Case

#### Threat of maritime attack small

Nincic 12 [Donna J., PhD in Political Science from New York University, Professor and Director of the ABS School of Maritime Policy and Management at the California Maritime Academy "Maritime Terrorism: How Real is the Threat? July 16, 2012 www.fairobserver.com/article/maritime-terrorism-how-real-threat]

Compared with land-based incidents, maritime terrorism represents a very small percentage of overall terrorist attacks. In 2003, the Aegis Research and Intelligence Database estimated between 1999 and 2003 that maritime targets represented less than one percent of all terrorist attacks. A similar analysis of the RAND terrorism database supports these figures; of the 40,126 terrorist incidents recorded between 1968 and 2007, only 136 (0.34%) were against the maritime domain. Not only are the maritime numbers very low, but maritime terrorist incidents of any significance have also not occurred for some years. The last major maritime attack was the bombing of the M/V Limburg while it was underway near Yemen in 2002. Since then, maritime attacks have tended to be fairly small in nature, consisting largely of bombings near port facilities or suspicious activities involving barges. There has been only one attack against a ship since the Limburg; the attack on the M Star in the Strait of Hormuz in 2010. The low incidence of maritime terrorist attacks is despite the fact that a number of very active terrorist groups have known maritime capabilities. At the same time, nations spend billions of dollars annually, protecting their ships, port facilities, and related maritime infrastructure from attack. This raises the question of how real the threat of maritime terrorism really is. Would these funds be better spent elsewhere, or are they a vital protection against a potential period of greater maritime terrorism in the future?

# Add-Ons

## 2AC Hegemony Add-On

#### OTEC is competitive with oil and solves dependence

Huang, Krock, and Oney 3 [Joseph C. Huang Senior Scientist for the National Oceanic and Atmospheric Administration, Hans J. Krock Professor of Ocean &. Resources Engineering, University of Hawaii and Stephen K. Oney, PhD. and executive vice present of OCEES July 2003 “Revisit Ocean Thermal Energy Conversion System” <http://www.springerlink.com/content/n864l3217156h045/fulltext.pdf>]

The most recent calculation for turnkey construction costs for an OTEC power plant is very competitive with that of equivalent oil-fired power plants. One cost estimation from a private company in Hawaii quoted about $0.04 per kilowatt-hour for a 100 MW floating OTEC plant (Krock and Oney, 2002). This reflects a much improved overall OTEC efficiency afforded by a significant reduction in the total heating and cooling water flow requirements. In addition, unlike fuel or coal fired power plants, the OTECenergy resource is automatically replenished by the solar system at no cost. Thus OTEC will reduce our reliance on imported oil for national and international energy security as well as eliminate GHG emissions. Due to current advancements in technology as well as the favorable financial environment, OTEC could prove to be more effective in addressing global energy requirements than any other currently available renewable energy resources. Renewable energy from wind, geothermal and photovoltaic, etc, is all good and should be encouraged. However, these are relatively minor in potential capacity, specific in geographic applicability, and mostly intermittent in power energy generations. OTEC provides uninterrupted power via the immense resource in the tropical ocean, either as base-load power to an island community or as a floating plant converting its electrical energy into an energy carrier such as hydrogen for use in fuel cell transportation or power production industries. The main economic characteristics of an OTEC system are that it is relatively turn-key capital intensive, but has very low operation and maintenance costs. The current world economic environment with low interest rate, low inflation rate, and high oil price, are encouraging conditions for OTEC development.

#### Oil Dependence will collapse US hegemony

Heinberg 5 [Richard Heinberg, Senior Fellow at the Post Carbon Institute, The Party's Over : Oil, War and the Fate of Industrial Societies, p. 218-219]

Regional rivalries and long-term strategy: Even without competition for energy resources, the world is full of conflict and animosity. For the most part, it is in the United States? interest to prevent open confrontation between regional rivals, such as India and Pakistan, Israel and Syria, and North and South Korea. However, resource competition will only worsen existing enmities. As the petroleum production peak approaches, the US will likely make efforts to take more direct control of energy resources in Saudi Arabia, Iran, the Caspian Sea, Africa and South America ? efforts that may incite other nations to form alliances to curb US ambitions. Within only a few years, OPEC countries will have control over virtually all of the exportable surplus oil in the world (with the exception of Russia?s petroleum, the production of which may reach a second peak in 2010, following an initial peak that precipitated the collapse of the USSR). The US ? whose global hegemony has seemed so complete for the past dozen years ? will suffer an increasing decline in global influence, which no amount of saber rattling or bombing of ?terrorist? countries will be able to reverse. Awash in debt, dependent on imports, mired in corruption, its military increasingly overextended, the US is well into its imperial twilight years.

#### Heg solves great power war

Khalizhad 11 [Zalmay Khalilzad 11 is the United States ambassador to Afghanistan, Iraq, and the United Nations during the presidency of George W. Bush and the director of policy planning at the Defense Department from 1990 to 1992, February 8, 2011, “The Economy and National Security; If we don’t get our economic house in order, we risk a new era of multi-polarity,” online: <http://www.nationalreview.com/articles/259024/economy-and-national-security-zalmay-khalilzad>]

We face this domestic challenge while other major powers are experiencing rapid economic growth. Even though countries such as China, India, and Brazil have profound political, social, demographic, and economic problems, their economies are growing faster than ours, and this could alter the global distribution of power. These trends could in the long term produce a multi-polar world. If U.S. policymakers fail to act and other powers continue to grow, it is not a question of whether but when a new international order will emerge. The closing of the gap between the United States and its rivals could intensify geopolitical competition among major powers, increase incentives for local powers to play major powers against one another, and undercut our will to preclude or respond to international crises because of the **higher** risk of escalation.¶ The stakes are high. In modern history, the longest period of peace among the great powers has been the era of U.S. leadership. By contrast, multi-polar systems have been unstable, with their competitive dynamics resulting in frequent crises and major wars among the great powers. Failures of multi-polar international systems produced both world wars.¶ American retrenchment could have devastating consequences. Without an American security blanket, regional powers could rearm in an attempt to balance against emerging threats. Under this scenario, there would be a heightened possibility of arms races, miscalculation, or other crises spiraling into all-out conflict. Alternatively, in seeking to accommodate the stronger powers, weaker powers may shift their geopolitical posture away from the United States. Either way, hostile states would be emboldened to make aggressive moves in their regions.¶ As rival powers rise, Asia in particular is likely to emerge as a zone of **great-power competition**. Beijing’s economic rise has enabled a dramatic military buildup focused on acquisitions of naval, cruise, and ballistic missiles, long-range stealth aircraft, and anti-satellite capabilities. China’s strategic modernization is aimed, ultimately, at denying the United States access to the seas around China. Even as cooperative economic ties in the region have grown, China’s expansive territorial claims — and provocative statements and actions following crises in Korea and incidents at sea — have roiled its relations with South Korea, Japan, India, and Southeast Asian states. Still, the United States is the most significant barrier facing Chinese hegemony and aggression.

### 1AR Internal Link EXTN

#### Lack of hydrogen extraction methods is preventing a transition to a hydrogen economy

Hamilton 4 [Tyler Hamilton, Writer for the Toronto Star, 6/24/04, “Iceland: The fire withinof future hydrogen economy; Iceland today planting the seeds,” The Toronto Star, p. Lexis]

The allure of hydrogen is understandable. It's a dream gas. When it is burned as a fuel or used as an energy carrier in fuel cells, no carbon dioxide or other greenhouse gases are released into the atmosphere. In cars powered by fuel-cell technology, the only by-products are heat and drops of pure water. Hydrogen also is the most plentiful substance in the universe. Unlike oil, it will never run out. So, given the environmental benefits and unlimited supply, why wouldn't the world run toward a hydrogen future? The problem is that hydrogen doesn't occur freely in nature - it's not floating in the air waiting to be captured. You can't drill for it like natural gas or oil, mine it like coal or chop it down like a tree. "It is bound up tightly in molecules of water, coal, natural gas, and so on," Joseph Romm, executive director of the Center for Energy and Climate Solutions, wrote in his book The Hype About Hydrogen. "To unbind it, a great deal of energy must be used." This has created the hydrogen conundrum. Even the most optimistic promoters of a hydrogen economy concede that it makes little sense to use hydrogen to run our cars and heat our homes if producing it means increasing our use of coal, natural gas or nuclear plants. "A hydrogen economy would be more environmentally benign only to the extent the energy sources used to produce, compress and distribute the hydrogen are benign," BMO Nesbitt Burns technology analyst Brian Piccioni wrote in a recent report.

#### OTEC electrolysis and ammonia production are key to the development of a hydrogen economy

Huang, Krock, and Oney 3 [Joseph C. Huang Senior Scientist for the National Oceanic and Atmospheric Administration, Hans J. Krock Professor of Ocean &. Resources Engineering, University of Hawaii and Stephen K. Oney, PhD. and executive vice present of OCEES July 2003 “Revisit Ocean Thermal Energy Conversion System” <http://www.springerlink.com/content/n864l3217156h045/fulltext.pdf>]

Perhaps the largest contribution to human society and the global environment that OTEC will have is as the supplier of hydrogen for the impending hydrogen economy. The huge energy reservoir in the tropical ocean available via the OTEC process will require a transportable form of that energy to allow access by the energy demand centers in the temperate zone. The most attractive and versatile transportable energy form is hydrogen. There are natural synergies between OTEC and hydrogen production, especially liquid hydrogen (LH2), which other renewables such as wind and solar do not possess. These include: • Full and efficient utilization can be made of the investment in production capacity because OTEC is available 24 hours per day and 365 days per year. This is in contrast to most renewable energy systems such as wind, waves, tide, direct solar and photovoltaics. Also, OTEC systems cannot exhaust the resource at the location where they are installed – in contrast to oil, natural gas, geothermal or even hydroelectric (the reservoir eventually silts up); • The efficient production of hydrogen by electrolysis requires very pure water for the KOH solution. A small part of the OTEC process can be used to produce this pure water from the surface seawater, resulting in high efficiency electrolysis; • Liquefying hydrogen by the Claude process requires an efficient heat sink to minimize process energy. The Claude process, which cools compressed hydrogen gas with liquid nitrogen prior to expansion through a Joules-Thompson valve to complete the liquefaction process, requires a significant heat sink to maintain liquid nitrogen temperatures (Ministry of Economic Affairs and Technology 1989). The cold seawater that is used in the OTEC process could provide this efficient heat sink; • Liquid hydrogen is most efficiently transported by ocean tanker. The off-shore OTEC hydrogen plant is already located on the transport medium and therefore would result in the lowest cost for transport to market. From a global perspective, ocean transport distances of OTEC derived LH2 are much shorter than our present system of oil transport from the Middle East around Africa to North America or Europe or from the Middle East around India and the Malay Peninsula to Japan. The successful development of a global hydrogen economy will undoubtedly have to involve the largest renewable energy resource in the world – the tropical ocean. OTEC technology is the best way to tap into this virtually limitless thermal reservoir to produce hydrogen to support the impending hydrogen economy. Offshore OTEC plants, utilizing techniques already developed for accessing deep water oil fields, can be adapted to produce and liquefy hydrogen and ensure a sustainable supply of hydrogen from an environmentally benign, renewable resource for future generations.

### 1AR Impact EXTN

#### Perception of decline will cause the US to lashout---triggers hegemonic wars

Goldstein 7 [Professor of Global Politics and International Relations @ University of Pennsylvania “Power transitions, institutions, and China's rise in East Asia: Theoretical expectations and evidence,” Journal of Strategic Studies, Volume 30, Issue 4 & 5 August 2007, pages 639 – 682]

Two closely related, though distinct, theoretical arguments focus explicitly on the consequences for international politics of a shift in power between a dominant state and a rising power. In War and Change in World Politics, Robert Gilpin suggested that peace prevails when a dominant state’s capabilities enable it to ‘govern’ an international order that it has shaped. Over time, however, as economic and technological diffusion proceeds during eras of peace and development, other states are empowered. Moreover, the burdens of international governance drain and distract the reigning hegemon, and challengers eventually emerge who seek to rewrite the rules of governance. As the power advantage of the erstwhile hegemon ebbs, it may become desperate enough to resort to the ultima ratio of international politics, force**,** to forestall the increasingly urgent demands of a rising challenger. Or as the power of the challenger rises, it may be tempted to press its case with threats to use force. It is the rise and fall of the great powers that creates the circumstances under which major wars, what Gilpin labels ‘hegemonic wars’, break out.13 Gilpin’s argument logically encourages pessimism about the implications of a rising China. It leads to the expectation that international trade, investment, and technology transfer will result in a steady diffusion of American economic power, benefiting the rapidly developing states of the world, including China. As the US simultaneously scurries to put out the many brushfires that threaten its far-flung global interests (i.e., the classic problem of overextension), it will be unable to devote sufficient resources to maintain or restore its former advantage over emerging competitors like China. While the erosion of the once clear American advantage plays itself out, the US will find it ever more difficult to preserve the order in Asia that it created during its era of preponderance. The expectation is an increase in the likelihood for the use of force – either by a Chinese challenger able to field a stronger military in support of its demands for greater influence over international arrangements in Asia, or by a besieged American hegemon desperate to head off further decline. Among the trends that alarm those who would look at Asia through the lens of Gilpin’s theory are China’s expanding share of world trade and wealth (much of it resulting from the gains made possible by the international economic order a dominant US established); its acquisition of technology in key sectors that have both civilian and military applications (e.g., information, communications, and electronics linked with to forestall, and the challenger becomes increasingly determined to realize the transition to a new international order whose contours it will define. the ‘revolution in military affairs’); and an expanding military burden for the US (as it copes with the challenges of its global war on terrorism and especially its struggle in Iraq) that limits the resources it can devote to preserving its interests in East Asia.14 Although similar to Gilpin’s work insofar as it emphasizes the importance of shifts in the capabilities of a dominant state and a rising challenger, the power-transition theory A. F. K. Organski and Jacek Kugler present in The War Ledger focuses more closely on the allegedly dangerous phenomenon of ‘crossover’– the point at which a dissatisfied challenger is about to overtake the established leading state.15 In such cases, when the power gap narrows, the dominant state becomes increasingly desperate. Though suggesting why a rising China may ultimately present grave dangers for international peace when its capabilities make it a peer competitor of America, Organski and Kugler’s power-transition theory is less clear about the dangers while a potential challenger still lags far behind and faces a difficult struggle to catch up. This clarification is important in thinking about the theory’s relevance to interpreting China’s rise because a broad consensus prevails among analysts that Chinese military capabilities are at a minimum two decades from putting it in a league with the US in Asia.16 Their theory, then, points with alarm to trends in China’s growing wealth and power relative to the United States, but especially looks ahead to what it sees as the period of maximum danger – that time when a dissatisfied China could be in a position to overtake the US on dimensions believed crucial for assessing power. Reports beginning in the mid-1990s that offered extrapolations suggesting China’s growth would give it the world’s largest gross domestic product (GDP aggregate, not per capita) sometime in the first few decades of the twentieth century fed these sorts of concerns about a potentially dangerous challenge to American leadership in Asia.17 The huge gap between Chinese and American military capabilities (especially in terms of technological sophistication) has so far discouraged prediction of comparably disquieting trends on this dimension, but inklings of similar concerns may be reflected in occasionally alarmist reports about purchases of advanced Russian air and naval equipment, as well as concern that Chinese espionage may have undermined the American advantage in nuclear and missile technology, and speculation about the potential military purposes of China’s manned space program.18 Moreover, because a dominant state may react to the prospect of a crossover and believe that it is wiser to embrace the logic of preventive war and act early to delay a transition while the task is more manageable, Organski and Kugler’s power-transition theory also provides grounds for concern about the period prior to the possible crossover.19 pg. 647-650

## 2AC Coral Reefs Add-On

#### OTEC is key to prevent coral reef collapse

Binger 4 [Al, Visiting Professor at Saga University Institute of Ocean Energy, Director of the University of West Indies Centre for Environment and Development, “Potential and Future Prospects for Ocean Thermal Energy Conversion (OTEC) In Small Islands Developing States (SIDS),” United Nations Educational, Scientific and Cultural Organization, United Nations Educational, Scientific and Cultural Organization]

The Maldives’ economy is based primarily on fishing and tourism; consequently, it depends on the extensive coral reef ecosystem. During 1999 to 2001, there was a two degree Celsius increase in the average temperature in the Indian Ocean. As a result, there was a significant ongoing reduction in the marine catch, as shown in Figure.6. This reduction in catch is due to the physiology of the coral reef ecosystem in which a number of symbiotic relationships exist between different biological organisms. An increase in temperature by a few degrees changes the relationships and the coral’s ability to convert sunlight into biomass, which provided the energy for the entire ecosystem including fish. This phenomenon is described as coral bleaching and this ends only when the seawater temperature returns to normal range. Recovery, also shown in Figure 6, takes much longer. OTEC takes heat from the surface as well as bring the cold water to the surface, so this could be utilized to help control bleaching of critical coral reef systems, potentially giving SIDS an option that is now not available.

#### Coral reef destruction destroys ocean biodiversity and causes warming

Hopenstand 2 [Danfa, from the University of Wisconsin law school, Wisconsin Environmental Law Journal, “Global Warming and its Impact on Near-Shore Communities: Protection Regimes for Fish and Coastal People Affected by Coral Reef Damage,” Spring, p. 90-930]

Coral reefs serve several important ecological and economic functions, and are thus especially vulnerable to destruction by human over-exploitation. Fish that live in coral reefs are an essential component of Pacific Island inhabitants' lives because they provide up to ninety percent of their protein needs. [n38](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n38) Since coral reef growth is close enough to the surface to break waves, coral reefs further function as buffers against storm surges and daily erosion. [n39](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n39) Coral reefs also serve as "carbon sinks" by absorbing carbon, thereby reducing the level of carbon in the atmosphere. [n40](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n40) In addition, selling reef fish serves as an important export income for island nations. [n41](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n41) Cut coral serves as construction material for families and businesses [n42](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n42) and crushed coral is a major ingredient of cement. [n43](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n43) Coastal people also rely on the marine life that live in coral reefs for medicinal purposes. [n44](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n44) For example, the venom from tropical cone snails substitutes morphine, and coral skeletons may replace bone grafts. [n45](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n45)¶ C. Implications of Coral Reef Destruction for Fish and Coastal People¶ The destruction of coral reefs has serious implications. According to the Intergovernmental Panel on Climate Change's Second Assessment Report in 1995, the most pronounced impacts of global warming will be related to water resources. [n46](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n46) Entire species will either shift to new locations and adapt to new habitats, or face localized and potentially widespread extinction. [n47](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n47) Under either scenario--moving or dying--coastal people face a serious threat. In addition, as species [\*92] respond to climate change, the productivity of ecosystems such as coral reefs declines. [n48](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n48) This results in the reduction of marine biodiversity, the services marine ecosystems provide marine life, and the services marine ecosystems provide human society. [n49](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n49)¶ The death of coral reefs and rise in sea levels could disrupt ocean life severely. Species may be forced to change feeding and breeding grounds, causing fishery stocks to shift. The repercussions of this shift could be enormous on island nations that depend on fish in their waters as a food source and for export. [n50](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n50) In the Federated States of Micronesia, for example, the marine environment and its resources are considered the basis of local culture. [n51](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n51) Besides using the ocean for recreation and cultural events, Micronesians rely on coral reef resources for in-shore and near-shore fishing. Locals trade fish as part of the nation's commerce and consume it as an essential source of nutrition. [n52](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n52) However, fish stocks in certain reef areas in Micronesia are now already seriously depleted, forcing locals to find alternative sources of fish and other foods. [n53](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n53)¶ Whether the cause of a food shortage is fish migration or local death, the result is the same for coastal people. Food shortages in nations affected by climate change could result in food riots and the mass movement of hunger driven migrants. [n54](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n54) A food shortage could require the negotiation of new treaties among nations facing different levels of fish stock or the renegotiation of current treaties between such nations. [n55](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n55)¶ This diminution in food supply near-shore is particularly devastating for coastal areas and island nations because of their heavy dependence on coral reefs for the supply of food. [n56](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n56) One-third of the world's marine fish species are found in coral reefs. [n57](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n57) Fishermen catch [\*93] ninety percent of the world's fish within two hundred nautical miles of the coast, and the majority of the catch is within the first five miles. [n58](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n58) These statistics are significant because coral reefs are usually found in relatively shallow, near-shore water. [n59](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n59) Coral animals live in shallow waters since their symbiotic algae require sunlight for food, and sunlight does not penetrate very deep in seawater. [n60](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n60) Reef fish make up ten percent of the global fish catch, and with other reef foods, support thirty to forty million people. [n61](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n61) More than three billion people--the majority of humankind--occupy coastal regions. [n62](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n62) This figure is expected to double by 2050. [n63](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n63) By the end of the century, two-thirds of the population of all developing countries will live along coasts. [n64](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n64) Half of the world's shorelines are in the tropics, and a third of those coasts are associated with coral reefs. [n65](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n65) Since the population in coastal areas tends to grow faster than inland populations, [n66](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n66) most coastal growth will occur in the tropics. Further, continuing population growth in coastal areas and on islands, such as the Maldives, compounds the potential food shortage crisis. [n67](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n67) For example, Hanoi's population has grown from 200,000 to over three million in the last fifty years; this population growth is matched by an enormous demand for food, particularly fish. [n68](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.120474.74405316639&target=results_DocumentContent&returnToKey=20_T20135515190&parent=docview&rand=1403758529847&reloadEntirePage=true" \l "n68)

#### Ocean biodiversity collapse causes extinction

Craig 3 [Associate Prof Law, Indiana U School Law -- McGeorge Law Review, 34 McGeorge L. Rev. 155 Lexis]

Biodiversity and ecosystem function arguments for conserving marine ecosystems also exist, just as they do for terrestrial ecosystems, but these arguments have thus far rarely been raised in political debates. For example, besides significant tourism values - the most economically valuable ecosystem service coral reefs provide, worldwide - coral reefs protect against storms and dampen other environmental fluctuations, services worth more than ten times the reefs' value for food production. [n856](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n856) Waste treatment is another significant, non-extractive ecosystem function that intact coral reef ecosystems provide. [n857](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n857) More generally, "ocean ecosystems play a major role in the global geochemical cycling of all the elements that represent the basic building blocks of living organisms, carbon, nitrogen, oxygen, phosphorus, and sulfur, as well as other less abundant but necessary elements." [n858](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n858) In a very real and direct sense, therefore, human degradation of marine ecosystems impairs the planet's ability to support life.¶ Maintaining biodiversity is often critical to maintaining the functions of marine ecosystems. Current evidence shows that, in general, an ecosystem's ability to keep functioning in the face of disturbance is strongly dependent on its biodiversity, "indicating that more diverse ecosystems are more stable." [n859](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n859) Coral reef ecosystems are particularly dependent on their biodiversity.¶ [\*265] Most ecologists agree that the complexity of interactions and degree of interrelatedness among component species is higher on coral reefs than in any other marine environment. This implies that the ecosystem functioning that produces the most highly valued components is also complex and that many otherwise insignificant species have strong effects on sustaining the rest of the reef system. [n860](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n860) Thus, maintaining and restoring the biodiversity of marine ecosystems is critical to maintaining and restoring the ecosystem services that they provide. Non-use biodiversity values for marine ecosystems have been calculated in the wake of marine disasters, like the Exxon Valdez oil spill in Alaska. [n861](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n861) Similar calculations could derive preservation values for marine wilderness.¶ However, economic value, or economic value equivalents, should not be "the sole or even primary justification for conservation of ocean ecosystems. Ethical arguments also have considerable force and merit." [n862](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n862) At the forefront of such arguments should be a recognition of how little we know about the sea - and about the actual effect of human activities on marine ecosystems. The United States has traditionally failed to protect marine ecosystems because it was difficult to detect anthropogenic harm to the oceans, but we now know that such harm is occurring - even though we are not completely sure about causation or about how to fix every problem. Ecosystems like the NWHI coral reef ecosystem should inspire lawmakers and policymakers to admit that most of the time we really do not know what we are doing to the sea and hence should be preserving marine wilderness whenever we can - especially when the United States has within its territory relatively pristine marine ecosystems that may be unique in the world.¶ We may not know much about the sea, but we do know this much: if we kill the ocean we kill ourselves, and we will take most of the biosphere with us. The Black Sea is almost dead, [n863](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n863) its once-complex and productive ecosystem almost entirely replaced by a monoculture of comb jellies, "starving out fish and dolphins, emptying fishermen's nets, and converting the web of life into brainless, wraith-like blobs of jelly." [n864](http://www.lexisnexis.com.mutex.gmu.edu/lnacui2api/frame.do?tokenKey=rsh-20.998326.1713850943&target=results_DocumentContent&returnToKey=20_T20135536549&parent=docview&rand=1403758680723&reloadEntirePage=true" \l "n864) More importantly, the Black Sea is not necessarily unique.

### 1AR Internal Link EXTN

#### Natural upwelling patterns are disrupted by rising surface water temperatures - destroys reef resiliency – OTEC key

Goreau and Hayes 8 [Thomas, of the Global Coral Reef Alliance at Cambridge, and Raymond, Howard University, “Effects of Rising Seawater Temperature on Coral Reefs,” http://www.globalcoral.org/wp-content/uploads/2014/01/effects\_of\_rising\_seawater\_temp\_coral\_reefs.pdf]

Ocean warming and the contributions from fossil fuel use constitute¶ real and pressing priorities requiring prompt attention. The current rise¶ of shallow water, near-shore sea temperatures in virtually all coral reef¶ habitats around the world gives reefs only a few years to a decade or¶ so before they lose their remaining living hard corals, if warming¶ continues at the present rate, less if it accelerates. The fact that all¶ major areas of coastal upwelling, responsible for the bulk of the¶ Earth’s pelagic fisheries, are warming faster than the global average¶ indicates that the growing thickness of the warm surface layer is¶ making upwelling less effective at bringing cold nutrient-rich water to¶ the surface, causing the collapse of pelagic food chains from the¶ bottom up. This will happen even in the absence of the overfishing that¶ has often been blamed as the only cause of fisheries decline. While¶ increased wind speeds in the interiors of the ocean basins may cause¶ increased wind-induced upwelling in some areas, these are biological¶ deserts and the increase in fisheries in these areas will not¶ compensate for the decline of coastal productivity, because they are¶ also very far from the coastlines, require much greater fishing effort¶ for less return, and much higher transportation costs. Global warming¶ is therefore a threat to both coral reef and pelagic fisheries, but for¶ different reasons, and serious, comprehensive, and complete global¶ efforts to reverse it are essential to preserve capture fisheries.¶ Analyses of satellite-derived sea surface temperature (SST) at over¶ 200 globally-distributed reef sites between 1982-2003 indicate that¶ coral reefs have not only been exposed repeatedly to high summer¶ SST anomalies, but also essential relief from thermal stress in the¶ winter is failing. Since reef organisms live very close to their¶ physiological tolerance for temperature, a mere 1.0 ºC rise in SST¶ results in stress induced bleaching of reef-building corals. Bleaching¶ results from uncoupling of the normal symbiosis between unicellular¶ algae (zooxanthellae) and coral soft tissue. Without their symbiotic¶ algae, starving corals no longer produce a skeleton, defend themselves¶ against predators, or reproduce. Warmer seas also promote microbial¶ growth, responsible for infectious diseases in reef organisms. The¶ same warming energizes intense tropical storms (hurricanes and¶ typhoons) that physically damage reefs and disrupt ecosystem¶ functions. Habitats are destroyed, pelagic organisms are dispersed,¶ biodiversity declines, and water quality deteriorates following storm¶ exposure.

### 1AR Impact EXTN

#### Biodiversity key to survival

Margoluis 96 [Richard, Master of Public Health, International Health , With A Concentration of Planning and Evaluation, Ph.D. in Epidemiology, Biodiversity Support Program, http://www.bsponline.org/publications/showhtml.php3?10]

Biodiversity not only provides direct benefits like food, medicine, and energy; it also affords us a "life support system." Biodiversity is required for the recycling of essential elements, such as carbon, oxygen, and nitrogen. It is also responsible for mitigating pollution, protecting watersheds, and combating soil erosion. Because biodiversity acts as a buffer against excessive variations in weather and climate, it protects us from catastrophic events beyond human control. The importance of biodiversity to a healthy environment has become increasingly clear. We have learned that the future well-being of all humanity depends on our stewardship of the Earth. When we overexploit living resources, we threaten our own survival.

## 2AC China Rise Add-On

#### Plan sets the US as a leader in OTEC developed – Prevents Chinese hegemony

Moore 6 [Bill, citing Dr. Hans Krock, founder of OCEES, April 12, "OTEC Resurfaces", http://www.evworld.com/article.cfm?storyid=1008]

"The United States is the best placed of any country in the world to do this," he contends. "The United States is the only country in the world of any size whose budget for its navy is bigger than the budget for its army." ¶ It's his contention that this will enable America to assume a leadership position in OTEC technology, allowing it to deploy plants in the Atlantic, Caribbean and Pacific, but he offers a warming.¶ "If we are stupid enough not to take advantage of this, well then this will be China's century and not the American century."¶ Krock is currently negotiating with the U.S. Navy to deploy first working OTEC plant offshore of a British-controlled island in the Indian Ocean -- most likely Diego Garcia though he wouldn't confirm this for security purposes.¶ He is also working with firms in Britain and Netherlands and will be headed to China for talks with the government in Beijing.¶ "The Chinese know very well that they cannot build there futures on oil," he stated, noting that China's is investing large sums of money in a blue water navy. "The United States will be playing catch-up in this technology. We're here. We're willing to do it. We're doing it with the Navy." He expects to put his first plant to sea sometime in 2008 after constructing it, mostly likely, in Singapore.¶ "We simply have to look at the all the alternatives [to conventional fossil fuels and nuclear power] and this is, hands down, the only alternative that's big enough to replace oil."

#### Rise of Chinese leadership leads to US heg collapse and Sino-US war

Mearsheimer 5 [John, Professor of Political science at the University of Chicago, “Clash of the Titans,” January, Foreign Policy, <http://www.foreignpolicy.com/story/cms.php?story_id=2740>.]

China cannot rise peacefully, and if it continues its dramatic economic growth over the next few decades, the United States and China are likely to engage in an intense security competition with considerable potential for war. Most of China's neighbors, including India, Japan, Singapore, South Korea, Russia, and Vietnam, will likely join with the United States to contain China's power. ¶ To predict the future in Asia, one needs a theory that explains how rising powers are likely to act and how other states will react to them. My theory of international politics says that the mightiest states attempt to establish hegemony in their own region while making sure that no rival great power dominates another region. The ultimate goal of every great power is to maximize its share of world power and eventually dominate the system. ¶ The international system has several defining characteristics. The main actors are states that operate in anarchy -- which simply means that there is no higher authority above them. All great powers have some offensive military capability, which means that they can hurt each other. Finally, no state can know the future intentions of other states with certainty. The best way to survive in such a system is to be as powerful as possible, relative to potential rivals. The mightier a state is, the less likely it is that another state will attack it. ¶ The great powers do not merely strive to be the strongest great power, although that is a welcome outcome. Their ultimate aim is to be the hegemon -- the only great power in the system. But it is almost impossible for any state to achieve global hegemony in the modern world, because it is too hard to project and sustain power around the globe. Even the United States is a regional but not a global hegemon. The best outcome that a state can hope for is to dominate its own backyard. ¶ States that gain regional hegemony have a further aim: to prevent other geographical areas from being dominated by other great powers. Regional hegemons, in other words, do not want peer competitors. Instead, they want to keep other regions divided among several great powers so that these states will compete with each other. In 1991, shortly after the Cold War ended, the first Bush administration boldly stated that the United States was now the most powerful state in the world and planned to remain so. That same message appeared in the famous National Security Strategy issued by the second Bush administration in September 2002. This document's stance on preemptive war generated harsh criticism, but hardly a word of protest greeted the assertion that the United States should check rising powers and maintain its commanding position in the global balance of power. ¶ China is likely to try to dominate Asia the way the United States dominates the Western Hemisphere. Specifically, China will strive to maximize the power gap between itself and its neighbors, especially Japan and Russia, and to ensure that no state in Asia can threaten it. ¶ It is unlikely that China will go on a rampage and conquer other Asian countries. Instead, China will want to dictate the boundaries of acceptable behavior to neighboring countries, much the way the United States does in the Americas. An increasingly powerful China is also likely to try to push the United States out of Asia, much the way the United States pushed the European great powers out of the Western Hemisphere. Not incidentally, gaining regional hegemony is probably the only way that China will get back Taiwan. ¶ Why should we expect China to act differently than the United States? U.S. policymakers, after all, react harshly when other great powers send military forces into the Western Hemisphere. These foreign forces are invariably seen as a potential threat to American security. Are the Chinese more principled, more ethical, less nationalistic, or less concerned about their survival than Westerners? They are none of these things, which is why China is likely to imitate the United States and attempt to become a regional hegemon. China's leadership and people remember what happened in the last century, when Japan was powerful and China was weak. In the anarchic world of international politics, it is better to be Godzilla than Bambi. ¶ It is clear from the historical record how American policymakers will react if China attempts to dominate Asia. The United States does not tolerate peer competitors. As it demonstrated in the 20th century, it is determined to remain the world's only regional hegemon. Therefore, the United States will seek to contain China and ultimately weaken it to the point where it is no longer capable of dominating Asia. In essence, the United States is likely to behave toward China much the way it behaved toward the Soviet Union during the Cold War.

### 1AR Impact Extensions

#### Chinese factions will seek disputes and conflicts – only U.S. heg can solve and deter this possibility

Friedberg 5 (Aaron L. Friedberg is Professor of Politics and International Affairs at Princeton University. From June 2003 to June 2005, he served as Deputy Assistant for National Security Affairs and Director of Policy Planning in the Office of the Vice President. “The Future of U.S.-China Relations: Is Conflict Inevitable?” Friedberg, Aaron L., 1956. International Security, Volume 30, Number 2, Fall 2005, pp. 7-45 (Article) Published by The MIT Press, 5/21/13) ELJ

Constructivist Optimists Constructivists believe that international relationships (like all political relations) are “socially constructed.” The nature of the interactions between two states is not simply the product of objective, material factors, such as the balance of trade or the balance of military power or the structure of domestic institutions. Interstate relations are also shaped to a considerable degree by subjective factors, by the beliefs and ideas that people carry around in their heads and that cause them to interpret events and data in particular ways. The most important of these can be grouped into three categories: “identities” (i.e., the collective self-perceptions of political actors and their shared perceptions of others); “strategic cultures” (i.e., sets of beliefs about the fundamental character of international politics and about the best ways of coping with it, especially as regards the utility of force and the prospects for cooperation); and “norms” (i.e., beliefs not only about what is efficacious but also about what is right or appropriate in the international realm).66 Identities, strategic cultures, and norms are strongly shaped by the prevailing interpretations of a society’s shared historical experiences. They are transmitted across generational lines by processes of education and acculturation and, though not cast in stone, they do tend to be highly resistant to change. The primary mechanism by which widely held beliefs evolve and are some- times transformed is through interaction with others. Such interactions convey new information and ideas that can help to displace prevailing conceptions.67 Because their theoretical perspective causes them to be attentive to the potential malleability of social relationships, constructivists tend to be optimists. If international politics is truly governed by scientific laws rooted in material reality, like the laws of physics, then what people believe about how the world works will matter only to the extent that it conforms to or deviates from reality. A man who chooses to step off the roof of a tall building because he prefers not to believe in the force of gravity will nevertheless fall quickly to the ground. Similarly, in the view of the pessimistic realists, the leader of a dominant state who does not believe that his country’s position will be challenged by a rising power (or who believes that such a power can be dissuaded from pursuing its ambitions by gentle diplomacy) is destined to be disappointed. But if relations between nations are shaped above all by beliefs, rather than objective material factors, there is always the possibility that people can change the world by changing how they think. At the most general level, constructivists assert that international politics tends to be competitive and violent, not because some immutable principles of human behavior require that it be so but rather be- cause, across the centuries, national leaders have tended to believe this to be the case. By acting in accordance with their pessimistic expectations, leaders have helped to make them come true. As Alexander Wendt puts it, “Realism is a self-fulfilling prophecy.”68 Provided that it was widely shared among the world’s most powerful nations, a more optimistic assessment of the prospects for, and benefits of, international cooperation could achieve similar status. As regards the U.S.-China relationship, **optimistic constructivists generally emphasize the possibility that China’s increasing participation in international institutions of various kinds will lead to shifts in its strategic culture, in the norms of international behavior accepted by its leaders, and ultimately in their conceptions of national identity.** In contrast to liberal optimists, who stress the role of institutions in altering the narrow cost-benefit calculations of rational decision-makers, constructivists believe that repeated interactions can actually change the underlying beliefs, interests, and mental categories of those who participate in them. Thus it may be true that some significant fraction of China’s rulers are still in the grips of old-fashioned ideas about the zero-sum character of international relations and about the potential utility of deception, surprise, and force in resolving interstate disputes. **These ideas may appear to be deeply rooted in traditional Chinese statecraft, as passed down in ancient texts, taught in military academies, and absorbed through the skin, as it were, by anyone raised in Chinese culture**. But what Iain Johnston has referred to as the “**parabellum paradigm” can be softened over time by repeated contacts between Chinese statesmen, scholars, and soldiers and their less fatalistic foreign counterparts**.69 Optimistic constructivists believe that **it was exactly these types of interactions between Soviet and Western scientists and arms control experts that helped to alter the course of Soviet foreign policy in the 1980s and to bring the Cold War to a peaceful conclusion**.70 A similar process of externally induced intellectual evolution is certainly possible in China and indeed, in the view of some optimists, it may already be well under way. At the same time as China’s strategic culture is shifting, its leaders may be moving toward a much broader embrace of what are essentially liberal norms and expectations regarding international behavior. Again, the mechanism at work here is not merely a calculation of material benefits but a process of socialization that reflects China’s profound desire to be accepted as a modern, advanced country and a citizen in good standing of the world community. According to Johnston and coauthor Paul Evans, China’s recent willingness to enter into multilateral international institutions such as the Comprehensive Test Ban Treaty reflects the fact that its leaders are becoming “more sensitive to social incentives” and more fearful “of appearing to be the pariah.”71 Whereas only a few years ago China’s rulers would have shunned participation in international institutions in the belief that it would impose unacceptable constraints on their freedom of action, today they are increasingly ready, even eager to join up. Participation and norm change are thus mutually reinforcing mechanisms: the more deeply embedded China becomes in the web of regional and global institutions, the more the beliefs and expectations of its leaders will come to conform to the emerging universal consensus that those institutions embody.72

# Off-Case Answers

## T Cards

### Oceans

#### OTEC uses the deep ocean

CreativeWorld9 2011 [“ADITYA(right) & PRAKASH (left)”. We have completed B.tech in Electronics and Communication Engineering (E.C.E).we are residing at Vishakhapatnam,A.P.we have designed this website with aim of helping the students of Engineering and all graduate fields..This blog contains mainly “IEEE abstracts with full papers in all respective fieldsOCEAN THERMAL ENERGY CONVERSION <http://www.creativeworld9.com/2011/03/abstract-and-full-paper-on-ocean.html>

OTEC, or Ocean Thermal Energy Conversion, is an energy technology that converts solar radiation to electric power. OTEC systems use the ocean's natural thermal gradient—the fact that the ocean's layers of water have different temperatures to drive a power-producing cycle. As long as the temperature between the warm surface water and the cold deep water differs by about 20°C (36°F), an OTEC system can produce a significant amount of power, with little impact on the surrounding environment. The distinctive feature of OTEC energy systems is that the end products include not only energy in the form of electricity, but several other synergistic products. The principle design objective was to minimize plan cost by minimizing plant mass, and taking maximum advantage of minimal warm and cold water flows. Power is Converted to high voltage DC, and is cabled to shore for conversion to AC and integration into the local power distribution network. The oceans are thus a vast renewable resource, with the potential to help us produce billions of watts of electric power. OCEAN THERMAL ENERGY CONVERSION Oceans cover more than 70% of Earth's surface, making them the world's largest solar collectors. The sun's heat warms the surface water a lot more than the deep ocean water, and this temperature difference creates thermal energy. Just a small portion of the heat trapped in the ocean could power the world.

#### OTEC is within the ocean and is development- the Ocean is what powers the plants

Oak Ridge National Library 2009 [ORNL is a national multi-program research and development facility managed by UT-Battelle for the U.S. Department of Energy Power from the Sea <http://web.ornl.gov/info/ornlreview/v44_3_11/article09.shtml>

OTEC uses temperature differences in the world's oceans to create energy. In the tropics, the surface water temperature is about 25 degrees C; and at 3000 feet down it's about 5 degrees C. "That's a difference of about 20 degrees C, and can be used to generate power," says James Klett of ORNL's Materials Science and Technology Division. The OTEC power generation system works by using this temperature difference to drive a closed-loop Rankine cycle power plant. The Rankine cycle begins by pumping the 25 degree C surface water through a heat exchanger to boil ammonia. The ammonia becomes a gas, which is used to spin a turbine-generator to produce power. Then, the 5 degree C water is used to cool the ammonia, which condenses to its liquid state within a heat exchanger called a condenser, and the cycle starts over again.

#### Energy development is topical, the ocean itself is what generated the electric power

Sharma & Sharma 2013 [R.C. Sharma Department of Applied Sciences and Humanities, Dronacharya College of Engineering, Khentawas, G urgaon . 1 and Niharika Sharma PGT, Meenakshi World School Gurgaon Energy from the Ocean and Scope of its Utilization in India http://www.ripublication.com/ijeem\_spl/ijeemv4n4\_17.pdf

The ocean can produce two types of energy: thermal energy from the sun's heat, and mechanical energy from the tides and waves. Oceans cover more than 70% of Earth's surface, making them the world's largest solar collectors. The sun's heat warms the surface water a lot more than the deep ocean water, and this temperature difference creates thermal energy. Just a small portion of the heat trapped in the ocean could power the world. Ocean mechanical energy is quite different from ocean thermal energy. Even though the sun affects all ocean activity, tides are driven primarily by the gravitational pull of the moon, and waves are driven primarily by the winds. As a result, tides and waves are intermittent sources of energy, while ocean thermal energy is fairly constant. The ocean also provides, naturally, various mechanisms to collect, concentrate and transform that energy into forms that might be more useful. The oceans are a heat engine that transforms solar energy into the kinetic energy of wind, waves and current. The average solar power flux onto the surface of the ocean at 15 o North latitude is about 0.2kW/ m 2 , but this is typically converted to trade winds of about 20 knots, which have a power flux of 0.6 kW/m 2 . Here though, the energy is over a vertical area, perpendicular to the wind. This wind energy subsequently is concentrated into a wave energy flux of 8 kW/m 2 [1].These forms of high quality energy are very useful, but often intermittent, require more or less large collectors, and may have environmental issues. On the other hand, wind and wave tend to be stronger in winter, when direct solar energy is l ower, so they may provide seasonal leveling in association with land based direct solar systems. Ocean Thermal Energy Conversion eliminates the heat collector, and provides steady power, but has practical issues and tends to be in distant locations

#### OTEC is the extraction of solar energy from oceans

CRRC 9 [Coastal Response Research Center, a partnership between the National Oceanic and Atmospheric Administration Office of Response and Restoration and the University of New Hampshire, November 3, "Technical Readiness of Ocean Thermal Energy Conversion", <http://coastalmanagement.noaa.gov/otec/docs/otectech1109.pdf>]

The oceans are natural collectors of solar energy and absorb billions of watts of¶ energy from the sun in the form of solar radiation daily. In the tropical latitudes, intense¶ sunlight and longer days result in significant heating of the upper 35 to 100 m of the¶ oceans, yielding comparatively warm (27 - 29°C) oceanic surface waters. Below this¶ warm layer the temperature gradually decreases to an average of about 4.4°C. When the¶ second law of thermodynamics is considered, this temperature differential represents a¶ significant amount of potential energy which, if extracted, would be a completely¶ renewable source of energy.¶ One method of extracting this energy is Ocean Thermal Energy Conversion¶ (OTEC). OTEC facilities take advantage of the Rankine cycle, a process which converts¶ thermal energy into kinetic energy via turbines. The turbines can then be used to drive¶ generators, producing electricity. There are two major OTEC facility designs: open-cycle,¶ and closed-cycle. In an open-cycle OTEC facility seawater is used as a working fluid.¶ Warm surface water is exposed to a vacuum, causing it to boil and generate steam. The¶ cold water from deep in the ocean is then pumped through a condenser, causing the steam¶ to condense (Figure 1). This constant vaporization and condensation is used to drive a¶ turbine, converting thermal energy into mechanical energy. The open-cycle process has¶ the added advantage of creating fresh water as a byproduct.

### A2: OTEC is solar

#### OTEC is ocean energy – distinct from solar energy in the literature.

Kobayashi, 1 (The Present Status and Features of OTEC and Recent Aspects of Thermal Energy Conversion Technologies, Hiroki KOBAYASHI Hitachi Zosen Corporation Sadayuki JITSUHARA, Dr. Xenesys Inc. Haruo UEHARA, Dr. Saga University, 2001 <http://www.nmri.go.jp/main/cooperation/ujnr/24ujnr_paper_jpn/Kobayashi.pdf>)

The world population is 6.1 billion in 2000, and it is still growing explosively. At the same time, energy consumed by human is also increasing explosively, as shown in Fig.1. By considering future economic growth and environmental problems it is obvious that in the 21st century we cannot rely on the current mainstream resources, i.e. oil, coal, and uranium for the world energy supply. Thus, we must face the urgent and important problem of developing an alternative energy source to fossil and nuclear fuel. For the alternative energy sources we can easily consider, for example, such as wind, solar and geothermal power. However, ocean energy should become also an important potential energy source which must be obtained. Among the various forms of ocean energy, the ocean thermal energy is plentiful and very stable. During the last decade, the technology of OTEC has been made great strides. It is worthy of special mention that OTEC technology is easily applicable in many industrial fields for recovery and saving of energy in lower temperature range and small thermal head.

## Midterms

### Link Turn

#### Clean energy projects spur voter support

Barb,3/7/2014 [Adams, Energy Production and Conservation’s Effects on Midterm Elections in the West http://www1.gcnlive.com/CMS/index.php/news/360-energy-production-and-conservation-s-effects-on-midterm-elections-in-the-west/360-energy-production-and-conservation-s-effects-on-midterm-elections-in-the-west

Results from the poll indicate that energy production and protecting public and private lands are the two key “vote motivating” issues and “that voters are far more likely to show support for candidates who seek to protect natural areas and public lands while proceeding with energy development.” Energy development, particularly hydraulic fracturing (“fracking”), has come under intense review in parts of the West, especially Colorado. Respondents in the poll also made it clear that they are more likely to vote for a candidate who would promote alternative or renewable energy. This view extended across party lines. However, when asked whether or not they would support reducing “red tape” associated with oil and gas development, there was a clear division along party lines. Republicans were found to be more likely (73%) to favor a reduction of red tape whereas Democrats were less likely (33%). Although Westerners are diverse politically, which was reflected in many of their choices, one area they stand united on is their love for the land. “More than half say that environmentally sensitive places on public lands should be permanently protected when energy production is allowed.” This sentiment was reflected by a majority of voters favoring Master Leasing Plans (MLPs) in regards to oil and gas drilling. The Bureau of Land Management (BLM) is responsible for balancing oil and gas drilling as well as the protection of millions of acres of public lands and the fish and wildlife on those lands throughout the West. In areas where there could be disputes “over the best use of the land,” the BLM is implementing a new tool called a Master Leasing Plan. Before any drilling could be considered, an MLP would need to be designed to delineate areas “appropriate for oil and gas drilling and also create protections where needed for wildlife, water, and historic sites.” Local businesses and governments, the public, and oil and gas companies would all be given opportunity to provide input on each MLP. A significant majority (62 to 67 percent) of all voters in all six states support MLPs, including Tea Party supporters. The November midterm elections will be critical to the 2016 elections. In the West, the key issues appear to be energy development and production and environmental protection and conservation. “Congressional candidates would be wise to consider their position on conservation and land-use issues carefully,” said Colorado College Economist and State of the Rockies Project Director Walter E. Hecox. “Westerners want their air, water, and land protected, and where a candidate stands on these issues could potentially sway votes.”

# \*\*\*OTEC Neg\*\*\*

# T

# Solvency

## Commercial Viability

#### Overlapping regulation of OTEC blocks commercial viability

Elefant 2002 [Carolyn, Principle Attorney at LOCE, November 19, " Proposed Strategies for Addressing Regulatory Uncertainty in Ocean Energy Development in the United States ", <http://www.energypulse.net/centers/article/article_display.cfm?a_id=79>]

The foregoing events suggest that presently, there is sufficient confidence in the functionality of ocean energy technology to warrant further investigation of its potential for commercialization. However, even if these pilot projects and investigative programs resolve all of the feasibility and economic concerns about ocean energy, one substantial barrier to commercialization of ocean energy would still remain: regulatory uncertainty. Regulatory uncertainty refers to those risks inherent in the obtaining any necessary licenses or permits to construct and operate the project from the appropriate regulatory authority. Risks exist in the regulatory process because both federal and state licensing or permitting authorities typically have the option of rejecting a permit application or alternatively, issuing a permit but including limits on operation or required enhancement measures to mitigate environmental impacts which can increase the overall cost of the project. In deciding whether to fund an energy project, investors must factor in the risks associated with licensing a project and will decline investment where there is considerable uncertainty that a project can or will be licensed on favorable terms. Indeed, regulatory uncertainty explains why nuclear power plants have long been regarded as an unappealing investment: given strong public opposition and stringent licensing requirements, the chances of a nuclear project obtaining a license which does not include onerous operating and mitigating conditions are slim. B. Why Ocean Energy Projects Carry Regulatory Uncertainty For a variety of reasons, ocean energy projects carry with them a higher degree of regulatory uncertainty than conventional energy projects. These reasons include:¶ Overlapping or unknown jurisdictional issues and requirements Most conventional energy projects such as fossil fuel, natural gas and even wind farms are subject to well established state siting and/or zoning laws applied by state regulatory bodies while development of most hydro power plants has been regulated by the Federal Energy Regulatory Commission ( FERC) for the past seventy five years. By contrast, it is unclear which regulatory agencies will have primary jurisdiction over ocean energy projects (with the exception of OTEC projects which are regulated by NOAA, pursuant to the OTEC Act). Consider the following myriad of possibilities:¶ Projects which will be sited up to three miles from shore are technically on state lands per the Submerged Lands Act which vests states with control and title over those lands. 43 U.S.C. sec. 1301(a)(2). Arguably then, states would have primary regulatory jurisdiction through state power plant siting and coastal development statutes At the same time, even for projects located on state lands, federal interests in navigation are implicated and as a result, even projects regulated by the state would likely still require various permits from the Army Corps of Engineers. ¶ To throw another wrench into the equation, the Federal Energy Regulatory Commission has jurisdiction over hydro power projects located on navigable and commerce clause waterways. 16 U.S.C. sec. 817. Several statutes define navigable waters as including waters within the three mile limit from shore while ocean projects could be classified as hydro power since they utilize water to generate electricity. Thus, FERC is another possible candidate for permitting or licensing ocean projects and indeed, has issued preliminary permits to study wave power projects. See Passamadquoddy Tribal Council, 11 FERC para. 62,236 (1980)(permit for tidal project near Cobscook Bay); Quantum Energy orders supra. ¶ For projects beyond the three mile limit from shore, i.e., on the Outer Continental Shelf, the Corps of Engineers retains permitting authority under Section 10 of the Rivers and Harbors Act, as extended by Section 4(d) of the Outer Continental Shelf Lands Act (OCSLA), 43 U.S.C.A. sec 1331-56. Indeed, as discussed earlier, the Corps is currently processing a permit for an offshore windfarm located five miles off the coast of Cape Cod, Massachusetts. However, the Secretary of Interior, through the Mineral Management Service (MMS) has long had administered the oil and gas leasing and production program on the Outer Continental Shelf and arguably, has more expertise over ocean based energy projects than the Corps of Engineers.¶ Variety in Types of Ocean Energy Projects In contrast to conventional technologies which can fall into more definite categories, e.g., coal, gas, hydro, there are a huge variety of projects which fall roughly within the rubric of ocean energy. These include OTEC, tidal power, wave energy systems employing pneumatic devices such as the Wells turbine; current energy which might employ slow moving turbines designed to operate in low head rivers and even offshore wave projects or hybrid wind-wave projects. The location of an ocean energy project - i.e., at shoreline, within three miles from shore or beyond three miles, depends upon the technology employed and thus, it might be impossible for one regulatory body to have jurisdiction over all ocean projects based on the existing parameters just discussed. ¶ Lack of Information as to Regulatory Standards Even after resolving which agency has regulatory responsibility over ocean energy projects, another unknown is what types of regulatory standards these agencies will apply to evaluate ocean energy projects? These agencies may decide that existing permitting regulations (which may either apply a broad public interest standard or establish specific criteria for reviewing environmental impacts, economic feasibility, etc...) suffice to evaluate ocean energy projects. Or the agencies may determine that ocean energy development, with an unproven track record, unknown impacts and questionable permanence (e.g., how long will the projects last in a harsh ocean environment?) could require additional regulations which would require more extensive studies on environmental impacts or the implementation of a decommissioning plan. ¶ C. Why Regulatory Uncertainty, if Left Unresolved, Will Present Problems The problem of regulatory uncertainty, if left unresolved, will stand as a major impediment to ocean energy development and commercialization for the reasons listed below:¶ Questions about which agency has authority to license ocean energy projects can contribute to turf wars amongst agencies and lead to a duplicative and confusing application process where a developer must submit several permit applications and possibly be subject to competing conditions for operation and mitigating impacts. Overlap between agencies thus leads to increased development costs and delay. ¶ Opponents of ocean energy projects can use regulatory uncertainty to their advantage to oppose a project by arguing that a particular regulatory agency lacks jurisdiction over the project. Jurisdictional questions can be taken all the way to the courts which could agree with project opponents and conclude that an agency lacked jurisdiction, thereby rendering the entire permit process a waste. ¶ Lack of regulatory standards makes it impossible to predict whether and on what terms a permit will issue which complicates the estimation of project costs. Such unpredictability may also deter future private investors from funding projects.

## OTEC Fails

#### OTEC not viable - expensive and inefficient

Science Clarified 7 [“Science and Technology: Energy Alternatives,” <http://www.scienceclarified.com/scitech/Energy-Alternatives/index.html>]

In theory, an OTEC system could continuously generate upward of 160 million watts of electricity. This amount of electricity could supply one hundred thousand homes with all of their energy needs on a daily basis. Yet, a large portion of this electricity needs to be used by the system itself to pump the cool water to the top of the structure. Many scientists feel this makes an OTEC system a poor choice for energy production. Presently, the concept of OTEC systems is being heavily researched. Japan has shown great interest in developing them to power its coastal cities. The United States has researched sites where an OTEC system may be effective, but plans to construct one are not yet underway. Some energy analysts believe OTEC systems will never become truly competitive with other renewable resources because of the high cost of building and maintaining the units. This, coupled with a low energy output, in comparison to the amount of energy used to run the system itself, may help to explain why OTEC systems have not yet been fully developed, although the concept has been researched for over fifty years.

#### OTEC can’t produce enough energy to solve

**Dworsky 6**

(Rick, has been involved in environmental conservation and energy issues for over 30 years in government and private industry, “A warm bath of energy -- ocean thermal energy conversion”, <http://www2.energybulletin.net/node/16811>, Accessed 6-27-14, LKM)

Given all the fantastic promise OTEC presents, the amount of useful energy that can be obtained from each cubic meter of sea water is relatively small. The quantity of water that would have to be processed to produce a significant amount of useful energy would be enormous. Deep cold water intake tubes 11 meters (36 feet) in diameter with pumps of the same scale are proposed for 100 megawatt units. "The discharge flow from 60,000 MW (0.6 percent of present world consumption) of OTEC plants would be equivalent to the combined discharge from all rivers flowing into the Atlantic and Pacific Oceans (361,000 m3 s-1)." [3] OTEC is a technology of oceanic magnitude. To ameliorate the enormous problems of Global Warming, Peak Oil, Fresh Water, and Food supplies, we are going to need proportionally large solutions. Our task would be easier if we could reverse Human Population pressures.

#### Large scale OTEC fails-infeasible

**Mckenna 8**

(Phil,Staff writer at New Scientist, “Plumbing the Oceans Could Bring Limitless Clean Energy”, <http://www.newscientist.com/article/mg20026836.000-plumbing-the-oceans-could-bring-limitless-clean-energy.html?page=2,Accessed> 06-27-14, LKM)

Still, both teams will have to work out issues such as how to connect the floating, bobbing platforms to fixed submarine power lines. Heat exchangers will have to be designed in a way that prevents excessive buildup of algae, barnacles and other marine organisms that could clog the system.¶ If these test plants are a success, larger, commercial-scale plants could transform the energy equation on Hawaii, where nearly 77 per cent of electricity is generated by burning oil. "It will be the major energy game changer for our state and elsewhere in the world if we can get OTEC working well at the 100 MW level or larger," says Lockheed collaborator Reb Bellinger of Makai Ocean Engineering.¶ But scaling up won't be easy. "A 100 MW plant might have a pipe 30 feet in diameter suspended 3000 feet. That's not a small challenge. You've got this huge structure vertically suspended. You've got a lot of stresses and strains from current, from the movement of platform on the surface - how you are going to anchor it and install it?" asks Bellinger.¶ Smaller designs have already run into trouble. In 2003, Indian engineers building a 1 MW ocean thermal plant attempted to lower an 800-metre cold water pipe into the ocean from a barge in the Bay of Bengal only to lose the pipe in 1100 metres of water. A new pipe met the same fate the following year. "Both times there were some winch problems and it fell to the bottom of the sea," says Subramanian Kathiroli, director of India's National Institute of Ocean Technology. "I don't think we will ever be able to go beyond 5 to 10 MW with present knowledge," he says.¶ Yet the technology will have to be scaled up if OTEC is ever to make a significant impact on the green power market. Hans Krock, who has worked on OTEC designs for the University of Hawaii, the US Department of Energy and others since 1980, says he's tired of testing. "Pilot tests have been done," Krock says. "It's not a matter of design, it's a matter of getting the economics right.”

#### OTEC is inefficient—extraction limitations

Energy Bulletin 6 [“A warm bath of energy: ocean thermal energy conversion,” 6-5-06, <http://www.energybulletin.net/node/16811>, KAPUSTINA]

Given all the fantastic promise OTEC presents, the amount of useful energy that can be obtained from each cubic meter of sea water is relatively small. The quantity of water that would have to be processed to produce a significant amount of useful energy would be enormous. Deep cold water intake tubes 11 meters (36 feet) in diameter with pumps of the same scale are proposed for 100 megawatt units. "The discharge flow from 60,000 MW (0.6 percent of present world consumption) of OTEC plants would be equivalent to the combined discharge from all rivers flowing into the Atlantic and Pacific Oceans (361,000 m3 s-1)." [3] OTEC is a technology of oceanic magnitude.To ameliorate the enormous problems of Global Warming, Peak Oil, Fresh Water, and Food supplies, we are going to need proportionally large solutions. Our task would be easier if we could reverse Human Population pressures. OTEC may be one of our best hopes for the environmentally clean, sustainable solutions we need to solve our global energy and environmental problems - or at least a substantial chunk of them. In combination with other renewable sources, efficiency gains, conservation and adequate voluntary population management, we may be able to maintain a semblance of world civilization. Perhaps we can still save our Nautilus.

## High Cost

#### OTEC costs too much and tech infeasible

**Friedman 14**

(Becca, Harvard Law Review, “Examining the future of Ocean Thermal Energy Conversion”, <http://www.oceanenergycouncil.com/examining-future-ocean-thermal-energy-conversion/>, Accessed 6-27-14, LKM)

Huge Capital, Huge Risks ¶ Despite the sound science, a fully functioning OTEC prototype has yet to be developed. The high costs of building even a model pose the main barrier. Although piecemeal experiments have proven the effectiveness of the individual components, a large-scale plant has never been built. Luis Vega of the Pacific International Center for High Technology Research estimated in an OTEC summary presentation that a commercial-size five-megawatt OTEC plant could cost from 80 to 100 million dollars over five years. According to Terry Penney, the Technology Manager at the National Renewable Energy Laboratory, the combination of cost and risk is OTEC’s main liability. “We’ve talked to inventors and other constituents over the years, and it’s still a matter of huge capital investment and a huge risk, and there are many [alternate forms of energy] that are less risky that could produce power with the same certainty,” Penney told the HPR.

## Storms

#### No solvency- OTEC vulnerable to hurricanes and salt water corrosion

**Friedman 14**

(Becca, Harvard Law Review, “Examining the future of Ocean Thermal Energy Conversion”, <http://www.oceanenergycouncil.com/examining-future-ocean-thermal-energy-conversion/>, Accessed 6-27-14, LKM)

Moreover, OTEC is highly vulnerable to the elements in the marine environment. Big storms or a hurricane like Katrina could completely disrupt energy production by mangling the OTEC plants. Were a country completely dependent on oceanic energy, severe weather could be debilitating. In addition, there is a risk that the salt water surrounding an OTEC plant would cause the machinery to “rust or corrode” or “fill up with seaweed or mud,” according to a National Renewable Energy Laboratory spokesman.

# Aquaculture Advantage

## No Fish Collapse

#### Fish stocks recovering

Economist 9 [“Grabbing It All”, 1-3, Lexis]

A variety of remedies have been tried, usually in combination. Thus regulations have been issued about the size and type of fish to be caught, the mesh of nets to be used, the number of days a month that boats may go to sea, the permissible weight of their catch and so on. In some countries fishermen are offered inducements to give up fishing altogether. Those that continue are, at least in theory, subject to monitoring both at sea and in port. Large areas are sometimes closed to fishing, to allow stocks to recover. Others have been designated as marine reserves akin to national parks. And some of the technology that fishermen use to find their prey is now used by inspectors to monitor the whereabouts of the hunters themselves. Most of **these measures have helped**, **as the recovery of stocks in various places has shown**. Striped bass and North Atlantic swordfish have returned along America's East Coast, for instance. Halibut have made a comeback in Alaska. Haddock, if not cod, have begun to recover in Georges Bank off Maine. And herring come and go off the coasts of Scotland. Those who doubt the value of government intervention have only to look at the waters off Somalia, a country that has been devoid of any government worth the name since 1991. The ensuing free-for-all has devastated the coastal stocks, ruining the livelihoods of local fishermen and encouraging them, it seems, to take up piracy instead.

#### No fish collapse

Economist 9 [“Plenty More Fish in the Sea?”, 1-3, Lexis]

An even gloomier assessment came in an article by 14 academics in Science in 2006. The accelerating erosion of biodiversity, often associated with overfishing, presaged a "global collapse" to the point, in 2048, where all species currently fished would be gone, they said. Even many scientists who are alarmed by the evidence of overfishing find such conclusions controversial. Most non-scientists are unmoved. For a start, fish appears to be in **plentiful supply**. Even cod is available; over 7m tonnes of cod-family (Gadidae) fish are caught each year. Sushi bars have spread across the world. To cater for the aversion to red meat, and a new-found need for omega-3 fatty acids, fish dishes are on every menu, even in steak houses. Supermarkets and restaurants boast of **"sustainable" supplies**, and sandwiches are reassuringly labelled "dolphin-friendly", however threatened the tuna within them may be. Best of all, for the ethical consumer, fish are now farmed (see box below). Salmon has become so **plentiful** that people weary of its delicate taste. Moreover, fishermen themselves seem sceptical of any long-term scarcity. They clamour for bigger quotas and fewer restrictions (except on foreign competitors), and complain that the scientists are either ignorant or one step behind the new reality. Those with long memories can cite previous collapses that have been followed by recoveries. And, in truth, not all collapses are due solely to overfishing: the sudden crash of California's sardine industry 60 years ago is now thought to have been partly caused by a natural change in the sea temperature. **Plenty of figures** seem to **support the optimists**. Despite the exploitation round its coasts, Britain, for instance, still landed 750,000 tonnes of Atlantic fish in 2006, two-thirds of what it caught in 1951; even cod is still being hauled from the north-east Atlantic, mostly by Norwegians and Russians. Some British fishing communities—Fraserburgh, for example—are in a sorry state, but others still prosper: the value of wet fish landed in Shetland, for example, rose from £21m in 1996 to £54m ($33m-99m) in 2006. Earnings from fishing in Alaska, in whose waters about half of America's catch is taken, rose from less than $800m in 2002 to nearly $1.5 billion in 2007. And for the world as a whole, the catch in 2006 was over 93m tonnes, according to the UN's Food and Agriculture Organisation, compared with just 19m in 1950 (see chart on next page). Its value was almost $90 billion.

#### No overfishing – declines are natural variability

Bluemink 8 [Elizabeth, Staff Writer – ADN, “Greenpeace Puts Pollock Fishery in its Cross Hairs”, Anchorage Daily News, 12-3, http://www.adn.com/news/alaska/story/609562.html]

Federal scientists say there are fewer fish but **the accusation of overfishing is false**. The pollock industry agrees with the federal scientists. "This (population decline) was not unexpected, and the sky is not falling," said David Benton, executive director of the Marine Conservation Alliance, which represents western Alaska fishing fleets, processors and ports. Federal scientists have called for a dramatic reduction in the pollock industry's harvest next year -- the lowest catch in the fishery's history -- in response to the decline. Greenpeace and other conservation groups say even deeper cuts in the catch are needed to ensure that pollock remain healthy in the long run. The federal scientists have recommended limiting the pollock harvest to 815,000 tons -- the smallest in more than 30 years. Greenpeace is pushing for a much smaller harvest: 458,000 tons. "Pollock is one of the most important food sources for every animal in the Bering Sea food web," said George Pletnikoff, a Greenpeace campaigner based in Alaska. Next week, the North Pacific Fishery Management Council will meet in Anchorage to consider next year's catch limit, among other tasks. The meetings begin Monday and are expected to spill over into the following week. "People can go to the Anchorage Hilton hotel next week and give their opinions and thoughts about the fishery. They should be involved in it," Pletnikoff said. National Marine Fisheries Service scientists say the decline in Bering Sea pollock is due to **natural variability** in the fish population that has been documented for decades, **not** **too much harvesting**.

#### Self-correction – diminishing returns means no fish extinction

Leal 2k [Donald, Senior Associate – Political Economy Research Center, “Homesteading the Oceans: The Case for Property Rights in U.S. Fisheries”, August, http://www.perc.org/pdf/ps19.pdf]

In a commons situation, entering the fishing grounds first and capturing the fish fastest is a compelling strategy. This is the time when search and capture costs are the lowest. Thus, each fisher is motivated to invest in equipment (e.g., faster boats and better detection devices) that improve the chances of winning the race for the fish—equipment that would not be necessary if the fishery were not under the strain of such competition. Not only do the stocks decline, but fishing becomes wastefully expensive as too many fishers invest in too much capital to catch too few fish. Because costs tend to rise rapidly as fish become scarcer, fisheries have historically reached **commercial extinction** before they are totally depleted. The additional costs of capturing the few remaining fish exceeded the returns, so that it became unprofitable to continue.4 **Thus**, while **extinction may be avoided**, the fishery frequently results in a lower-than-optimal (and perhaps severely depleted) fish population and an overinvestment in fishing effort.

## No Food Wars

#### Food wars are a myth – there’s zero empirical evidence

Salehyan 7 [Idean, Professor of Political Science – University of North Texas, “The New Myth About Climate Change”, Foreign Policy, Summer, http://www.foreignpolicy.com/story/cms.php?story\_id=3922]

First, aside from a few anecdotes, there is **little systematic empirical evidence** that resource scarcity and changing environmental conditions lead to conflict. In fact, several studies have shown that an abundance of natural resources is more likely to contribute to conflict. Moreover, even as the planet has warmed, the number of civil wars and insurgencies has decreased dramatically. Data collected by researchers at Uppsala University and the International Peace Research Institute, Oslo shows a steep decline in the number of armed conflicts around the world. Between 1989 and 2002, some 100 armed conflicts came to an end, including the wars in Mozambique, Nicaragua, and Cambodia. If global warming causes conflict, we should not be witnessing this downward trend. ¶ Furthermore, if famine and drought led to the crisis in Darfur, why have scores of environmental catastrophes failed to set off armed conflict elsewhere? For instance, the U.N. World Food Programme warns that 5 million people in Malawi have been experiencing chronic food shortages for several years. But famine-wracked Malawi has yet to experience a major civil war. Similarly, the Asian tsunami in 2004 killed hundreds of thousands of people, generated millions of environmental refugees, and led to severe shortages of shelter, food, clean water, and electricity. Yet the tsunami, one of the most extreme catastrophes in recent history, did not lead to an outbreak of resource wars. Clearly then, there is much more to armed conflict than resource scarcity and natural disasters.

#### No shortages – food is abundant

Poole 6 [Holly Kavana, Institute for Food and Development Policy, “12 Myths About Hunger”, Backgrounder, 12(2), Summer, 4-9, http://www.foodfirst.org/12myths]

Myth 1: Not Enough Food to Go Around Reality: Abundance, not scarcity, best describes the world's food supply. Enough wheat, rice and other grains are produced to provide every human being with 3,200 calories a day. That doesn't even count many other commonly eaten foods - ­vegetables, beans, nuts, root crops, fruits, grass-fed meats, and fish. Enough food is available to provide at least 4.3 pounds of food per person a day worldwide: two and half pounds of grain, beans and nuts, about a pound of fruits and vegetables, and nearly another pound of meat, milk and eggs - ­enough to make most people fat! The problem is that many people are too poor to buy readily available food. Even most "hungry countries" have enough food for all their people right now. Many are net exporters of food and other agricultural products.

#### Democracy solves the impact

Salehyan 7 [Idean, Professor of Political Science – University of North Texas, “The New Myth About Climate Change”, Foreign Policy, Summer, http://www.foreignpolicy.com/story/cms.php?story\_id=3922]

To be sure, resource scarcity and environmental degradation can lead to social frictions. Responsible, accountable governments, however, can prevent local squabbles from spiraling into broader violence, while mitigating the risk of some severe environmental calamities. As Nobel laureate Amartya Sen has observed, **no democracy has ever experienced a famine**. Politicians who fear the wrath of voters usually do their utmost to prevent foreseeable disasters and food shortages. Accountable leaders are also better at providing public goods such as clean air and water to their citizens.

## No SCS Conflict

#### South China Seas are stable – China lacks capability and interdependence checks

Rosenberg 9 [David, Professor of Political Science – Middlebury College and Research Fellow at the Research School of Pacific and Asian Studies – Australian National University, “Dire Straits: Competing Security Priorities in the South China Sea”, The Asia-Pacific Journal, 3-20, http://japanfocus.org/-David-Rosenberg/1773]

From the Taiwan Strait to the Strait of Malacca, security concerns are growing around the South China Sea. While the Bush Administration sees a resurgent Chinese military threat across the Taiwan Strait and a terrorist threat in the Strait of Malacca, many countries between the Straits are more concerned about security for their maritime resources from the threats of competitors, traffickers, poachers, and pirates. Security Concerns in the South China Sea Several recent statements and appointments highlight the current Bush administration view of China's threat to Taiwan. Porter Goss, director of the U.S. Central Intelligence Agency, warned that improved Chinese capabilities not only threaten Taiwan but also U.S. forces in the (western Pacific) region. U.S. Defense Secretary Donald Rumsfeld worried that the Chinese navy was building some amphibious landing ships for possible use across the Taiwan Strait. The appointment of combative neoconservative John Bolton as U.S. ambassador to the United Nations sends a clear and ominous signal: formerly a paid consultant to the Taiwanese government, Bolton has advocated Taiwan's independence and its full U.N. membership. Then, in February 2005, Secretary of State Condoleezza Rice, Defense Secretary Donald Rumsfeld and their Japanese counterparts announced a significant alteration in the U.S.-Japan Security Alliance by identifying security in the Taiwan Strait as a "common strategic objective." Has there been any big shift in the balance of power around the Taiwan Strait that warrants this U.S. response? The Chinese defense budget has grown by double-digit increases for the past fourteen years. This year it's up by 12 percent. But that is not significantly faster than the Chinese economy as a whole is growing. China is modernizing its defenses -- adding anti-ship missiles to aircraft, acquiring AWACS-airborne early warning and control systems, guided missile destroyers and frigates. However, its power projection capabilities are limited. It lacks any long-range amphibious capability or support infrastructure to supply forces over long distances for a protracted period. It also lacks heavy cargo-carrying aircraft, comprehensive air defenses, seaworthy ships, and aircraft carriers. Given the current state of Chinese equipment and training, the Chinese have **no capability to pursue an expansionist** maritime **policy in the** Taiwan Strait or the **South China Sea**. [1] By contrast, the U.S. has **overwhelming military superiority** and an **expansive network** of military bases across the Asia-Pacific. The U.S. Pacific Fleet is the world's largest naval command, including approximately 190 ships, about 1,400 Navy and Marine Corps aircraft and 35 shore installations. Over 300,000 Navy, Army, Air Force, Marine Corps, Special Operations, and Intelligence military personnel are integrated under the unified command of PACOM, the U.S. Pacific Command. What are China's strategic goals between the Straits? China's Defense White Paper of 2002 emphasizes the importance of pursuing peaceful external relations initiatives through multilateral, cooperative approaches to promote domestic development. The most recent Defense White Paper, published in December of 2004, reiterates this priority. More important than statements of good intentions, however, China has taken **significant steps** to implement this goal. It was evident in the Framework Agreement on ASEAN-China Comprehensive Economic Cooperation, negotiated in November 2002. That led to the agreement signed in November 2004 to implement an ASEAN-China Free Trade Area (FTA) by 2010. Following the 10th Summit Meeting of the Association of Southeast Asian Nations (ASEAN), in Vientiane, Laos in November 2004, Beijing held its own summit with ASEAN leaders (ASEAN Plus One) and then joined Japan and the Republic of Korea in discussions with ASEAN leaders (ASEAN Plus Three, or APT). Beijing had earlier in November hosted the first Security Policy Conference of the ASEAN Regional Forum. It featured an anti-piracy drill and a workshop on countering terrorism. Regional Economic and Financial Agreements Regional economic agreements were the main achievements of these meetings. However, the ASEAN Plus Three sessions identified other areas for cooperation, including deeper cooperation in investment and finance, expanded security dialogue and cooperation, expanded cultural exchanges, and periodic progress reviews. Perhaps the most dramatic developments have occurred in regional financial cooperation. Finance ministers of the ASEAN+3 countries have launched an Asian Bond Markets Initiative and the regional central bankers group set up two Asian Bond Funds in early 2005. These are key steps in addressing one of the major weaknesses in the region's development as indicated by the currency and financial crisis that struck large parts of the region in 1997: the heavy reliance by firms on short-term bank loans for financing. As Jennifer Amyx notes, many countries in East Asia maintain high savings rates but, because of the absence of stable long-term debt markets, the savings deposited into local banks tended to be funneled out to international financial centers and then back into the region as short-term foreign currency loans. This situation creates a problem referred to as a "double mismatch" -- that is, a mismatch between debt maturities (short-term borrowing for long-term investments) and the denomination of this debt (in foreign rather than local currencies). [2] The ASEAN+3 finance ministers had earlier set up a network of bilateral currency swaps to permit a country beset by a speculative attack to draw on reserves of other nations. The program -- the Chiang Mai Initiative (CMI) -- went into effect at the end of 2003. Japan, with the largest reserves in the region, led negotiations over swap arrangements and will play the role of arbitrator for currency loans. China, another potential lender with substantial reserves in excess of potential needs, also lent its support to the CMI. Widespread participation by ASEAN Plus Three members in these initiatives encourages smooth financial liberalization processes and thereby bolsters regional stability. It also reinforces the efforts of various working groups to improve transparency and information dissemination and to strengthen settlement systems and regulatory reforms. China's shift to a more proactive position on regional financial cooperation has **greatly facilitated** these recent financial developments. **As a result, interdependence** between the Chinese economy and other economies **in the region has deepened significantly in recent years**. Today, trade by ASEAN member nations with China far exceeds trade conducted within the ASEAN grouping, while China is predicted to soon overtake the United States as Japan's top trading partner. Levels of investment in China by countries in the region are also extremely high. The **worst case scenario** is not Chinese domination but a **Chinese meltdown**, as many regional monetary authorities are quick to note.

#### Many factors check South China Sea war

Joyner 98 [Chris, Professor of International Relations – Georgetown University, New England Law Review, Spring, Lexis]

Nevertheless, several factors suggest the unlikelihood of large-scale military conflict over the Spratlys in the foreseeable future. For one, there is the geography: These islands are scattered over an immense area, nearly 200,000 square kilometers. Considerable room is available for naval patrols to maneuver and miss contact with one another. Relatedly, the Spratlys are more than 300 kilometers (185 miles) from [\*837] the Philippine and Vietnamese coasts, and more than 1000 kilometers (600 miles) from mainland China. This distance presents serious difficulties for any claimant government to patrol more than a small area of the Spratly archipelago at any one time, especially given these states’ relatively weak capabilities for projecting armed forces. No claimant state possesses sufficient logistical support capabilities to ensure effective occupation and maintain extended control over these islands, which underscores the importance of relative naval size. Even so, these conditions presumably should permit greater opportunities for confidence building measures to be considered as alternative strategies. 50 The Cold Wars passing has also fostered a sense of rapprochement throughout Asia, which makes the political costs of a large-scale military conflict in Spratlys less acceptable to the PRC or Taiwan. 51 The dynamic economic expansion of ASEAN counties, increasingly close links with the international community, and strategically significant shipping lanes through the South China Sea -- all converge to dissuade overt attempts by any state, including the PRC, to strive for regional military domination. That the economies of both the PRC and Taiwan have become increasingly interdependent with those of Southeast Asian states, including other claimants to the Spratlys, underscores that reluctance.

#### No escalation

Bush and O’Hanlon 7 [Richard and Michael, Senior Fellows – Brookings Institution, “U.S. Grapples With China’s Rise, Taiwan”, The Daily Yomiuri (Tokyo), 5-3, Lexis]

But most of the issues and frictions that accompany China's rise can be managed. The good news is that China and the United States, not to mention other key regional players like Japan, now have politicians and bureaucracies that are relatively good at preventing serious problems from becoming grounds for war. China will want to flex its military muscle more in the future, but it also wants economic prosperity for the political stability that comes with it. In addition, the United States and its regional partners know how to maintain open dialogue with Beijing while also sustaining vigorous defense alliances. China has enough reason to worry about nuclear weapons and global instability that it will not be totally oblivious to our concerns about proliferating countries such as Iran and North Korea. Conflict with the littoral nations of Japan, the Philippines or Vietnam over disputed seabed resources (like oil in the East China Sea or small islets in the South China Sea) is **highly unlikely**.

## No Russian Accidental Launch

#### No accidental launch -Early warning systems solve

Bailey 98 [Kathleen, Snr Fellow @ Lawrence Livermore National Laboratory, August, NIPP, http://www.nipp.org/5.php]

The United States and Russia have satellite- and ground-based systems to detect and track the launch of ballistic missiles toward their territories, as well as some capabilities to warn of approaching aircraft. Additionally, both nations have communications established that enable them to raise questions and seek clarification should there be unexplained activity that appears threatening. Critics who favor de-alerting cite an incident in January 1995 as evidence that early warning in Russia is inadequate and could lead to hasty Russian nuclear use. The incident involved a Russian alert response to a research rocket fired from Norway. But, while some people viewed President Yeltsin's order for an alert as excessively dangerous, others noted that it was actually an example of the system working as it should: a missile firing was observed and the leadership stepped up readiness in event that it was actually an attack.

#### Numerous checks and balances

Bailey 98 [Kathleen, Snr Fellow @ Lawrence Livermore National Laboratory, August, NIPP, http://www.nipp.org/5.php]

Neither U.S. nor Russian nuclear weapons can be fired accidentally, nor can an illegitimate order to fire be acted upon. There are **numerous checks and balances** to **assure a very high level of control** over weapons (see Table 2). Nuclear weapons require a series of steps not only to issue the order to fire (and for the recipient to authenticate the order once received), but also to execute the order. For example, instruction codes to issue a command to fire U.S. nuclear weapons are kept in a safe. To open the safe requires that an order from the commander-in-chief (or his successor) be received and de-coded. Two individuals, each with complementary components of the combination or key to the safe must then participate in opening it. (In Russia, there are three individuals.) A single person cannot do the action, nor can it be done by only the two people with the key; others must be aware and complicit in the action. The weapons themselves also have codes and/or mechanical devices, which must be implemented or activated correctly to enable the weapon to be fired.

#### Alt cause – high alert

DDI 2 [Defense Daily International, 2-8, Lexis]

According to experts, Russia and the United States each currently possess about 6,000 strategic weapons, a significant portion of which are continuously maintained on high alert, the report said. And, it added, the total number of warheads maintained on high alert by both the Russian and the United States equals 3,500-4,000. "The launch-on-warning concept, coupled with a flawed early warning systems (EWS), increases the probability of an accidental nuclear war," the report warned. "Simulations of a nuclear attack have shown that the political leadership of the country, in order to prevent the loss of their own offensive arms, will be forced to make the decision to deliver a retaliatory strike within an extremely short period of time, three to four minutes." Further, they said, the high alert status of nuclear weapons increases  
the risk of an accidental nuclear war for a number of reasons including: data processing and combat command and control systems errors; technical faults and failures of combat systems; inadequate evaluation of the evolving situation by the top political and military command, resulting in erroneous decision making; and erroneous or unauthorized actions as well as mental breakdowns of the attending military personnel in charge of the nuclear weapons.

#### No escalation

Kislov 93 [Alexander K., Professor and Director of Peace and Research Institute, Inadvertent Nuclear War, p. 239-240]

A deliberate nuclear war between East and West is out of the question; but what about a war caused by chance factors? An accidental or unauthorized launching of a missile or even of several missiles (in itself highly improbable) is **unlikely** to bring about a full-scale nuclear war when neither side has any incentive for it. We assume a **very small probability** of a **very limited** (“automatic” or unauthorized) reaction and a **close-to-zero probability** of a very limited authorized ‘retaliation’; this is the **maximal assumption** that is **possible** if we want to remain realistic.

#### Deterrence checks

Waltz 95 [Kenneth, Professor of Political Science – University of California Berkeley, The Spread of Nuclear Weapons: A Debate, p. 111]

Deterrence is also a considerable guarantee against accidents, since it causes countries to take good care of their weapons, and against anonymous use, since those firing the weapons can neither know that they will be undetected nor what form of punishment detection might bring. In life, uncertainties abound. In a conven­tional world, they more easily lead to war because less is at stake. Even so, it is difficult to think of wars that have started by accident even before nuclear weapons were invented. It is hard to believe that nuclear war may begin accidentally, when less frightening conventional wars have rarely done so.

## No Impact to Failed States

#### Many countries empirically deny the impact

Impact Lab 10 [6/21, “The 2010 Failed States Index.” <http://www.impactlab.com/2010/06/21/the-2010-failed-states-index/>]

Given time and the right circumstances, countries do recover. Sierra Leone and Liberia, for instance, no longer rank among the top 20 failing states, and Colombia has become a stunning success story. Few remember today that the Dominican Republic once vied with its neighbor Haiti for the title of “worst [Caribbean](http://www.impactlab.com/2010/06/21/the-2010-failed-states-index/) basket case.” But the overall story of the Failed States Index is one of wearying constancy, and 2010 is proving to be no different: Crises in Guatemala, [Honduras](http://www.impactlab.com/2010/06/21/the-2010-failed-states-index/), Iran, and Nigeria — among others — threaten to push those unstable countries to the breaking point.

#### No impact to failed states

Patrick 11 senior fellow, director – program on international institutions and global governance @ CFR, 4/15/11, Stewart M, “Why Failed States Shouldn’t Be Our Biggest National Security Fear,” <http://www.cfr.org/international-peace-and-security/why-failed-states-shouldnt-our-biggest-national-security-fear/p24689>

In truth, while failed states may be worthy of America's attention on humanitarian and development grounds, most of them are irrelevant to U.S. national security. The risks they pose are mainly to their own inhabitants. Sweeping claims to the contrary are not only inaccurate but distracting and unhelpful, providing little guidance to policymakers seeking to prioritize scarce attention and resources.¶ In 2008, I collaborated with Brookings Institution senior fellow Susan E. Rice, now President Obama's permanent representative to the United Nations, on an index of state weakness in developing countries. The study ranked all 141 developing nations on 20 indicators of state strength, such as the government's ability to provide basic services. More recently, I've examined whether these rankings reveal anything about each nation's role in major global threats: transnational terrorism, proliferation of weapons of mass destruction, international crime and infectious disease.¶ The findings are startlingly clear. Only a handful of the world's failed states pose security concerns to the United States. Far greater dangers emerge from stronger developing countries that may suffer from corruption and lack of government accountability but come nowhere near qualifying as failed states.¶ The link between failed states and transnational terrorism, for instance, is tenuous. Al-Qaeda franchises are concentrated in South Asia, North Africa, the Middle East and Southeast Asia but are markedly absent in most failed states, including in sub-Saharan Africa. Why? From a terrorist's perspective, the notion of finding haven in a failed state is an oxymoron. Al-Qaeda discovered this in the 1990s when seeking a foothold in anarchic Somalia. In intercepted cables, operatives bemoaned the insuperable difficulties of working under chaos, given their need for security and for access to the global financial and communications infrastructure. Al-Qaeda has generally found it easier to maneuver in corrupt but functional states, such as Kenya, where sovereignty provides some protection from outside interdiction.¶ Pakistan and Yemen became sanctuaries for terrorism not only because they are weak but because their governments lack the will to launch sustained counterterrorism operations against militants whom they value for other purposes. Terrorists also need support from local power brokers and populations. Along the Afghanistan-Pakistan border, al-Qaeda finds succor in the Pashtun code of pashtunwali, which requires hospitality to strangers, and in the severe brand of Sunni Islam practiced locally. Likewise in Yemen, al-Qaeda in the Arabian Peninsula has found sympathetic tribal hosts who have long welcomed mujaheddin back from jihadist struggles.¶ Al-Qaeda has met less success in northern Africa's Sahel region, where a moderate, Sufi version of Islam dominates. But as the organization evolves from a centrally directed network to a diffuse movement with autonomous cells in dozens of countries, it is as likely to find haven in the banlieues of Paris or high-rises of Minneapolis as in remote Pakistani valleys.¶ What about failed states and weapons of mass destruction? Many U.S. analysts worry that poorly governed countries will pursue nuclear, biological, chemical or radiological weapons; be unable to control existing weapons; or decide to share WMD materials.¶ These fears are misplaced. With two notable exceptions — North Korea and Pakistan — the world's weakest states pose minimal proliferation risks, since they have limited stocks of fissile or other WMD material and are unlikely to pursue them. Far more threatening are capable countries (say, Iran and Syria) intent on pursuing WMD, corrupt nations (such as Russia) that possess loosely secured nuclear arsenals and poorly policed nations (try Georgia) through which proliferators can smuggle illicit materials or weapons.¶ When it comes to crime, the story is more complex. Failed states do dominate production of some narcotics: Afghanistan cultivates the lion's share of global opium, and war-torn Colombia rules coca production. The tiny African failed state of Guinea-Bissau has become a transshipment point for cocaine bound for Europe. (At one point, the contraband transiting through the country each month was equal to the nation's gross domestic product.) And Somalia, of course, has seen an explosion of maritime piracy. Yet failed states have little or no connection with other categories of transnational crime, from human trafficking to money laundering, intellectual property theft, cyber-crime or counterfeiting of manufactured goods.¶ Criminal networks typically prefer operating in functional countries that provide baseline political order as well as opportunities to corrupt authorities. They also accept higher risks to work in nations straddling major commercial routes. Thus narco-trafficking has exploded in Mexico, which has far stronger institutions than many developing nations but borders the United States. South Africa presents its own advantages. It is a country where “the first and the developing worlds exist side by side,” author Misha Glenny writes. “The first world provides good roads, 728 airports . . . the largest cargo port in Africa, and an efficient banking system. . . . The developing world accounts for the low tax revenue, overstretched social services, high levels of corruption throughout the administration, and 7,600 kilometers of land and sea borders that have more holes than a second-hand dartboard.” Weak and failing African states, such as Niger, simply cannot compete.¶ Nor do failed states pose the greatest threats of pandemic disease. Over the past decade, outbreaks of SARS, avian influenza and swine flu have raised the specter that fast-moving pandemics could kill tens of millions worldwide. Failed states, in this regard, might seem easy incubators of deadly viruses. In fact, recent fast-onset pandemics have bypassed most failed states, which are relatively isolated from the global trade and transportation links needed to spread disease rapidly.¶ Certainly, the world's weakest states — particularly in sub-Saharan Africa — suffer disproportionately from disease, with infection rates higher than in the rest of the world. But their principal health challenges are endemic diseases with local effects, such as malaria, measles and tuberculosis. While U.S. national security officials and Hollywood screenwriters obsess over the gruesome Ebola and Marburg viruses, outbreaks of these hemorrhagic fevers are rare and self-contained.¶ I do not counsel complacency. The world's richest nations have a moral obligation to bolster health systems in Africa, as the Obama administration is doing through its Global Health Initiative. And they have a duty to ameliorate the challenges posed by HIV/AIDS, which continues to ravage many of the world's weakest states. But poor performance by developing countries in preventing, detecting and responding to infectious disease is often shaped less by budgetary and infrastructure constraints than by conscious decisions by unaccountable or unresponsive regimes. Such deliberate inaction has occurred not only in the world's weakest states but also in stronger developing countries, even in promising democracies. The list is long. It includes Nigeria's feckless response to a 2003-05 polio epidemic, China's lack of candor about the 2003 SARS outbreak, Indonesia's obstructionist attitude to addressing bird flu in 2008 and South Africa's denial for many years about the causes of HIV/AIDS.¶ Unfortunately, misperceptions about the dangers of failed states have transformed budgets and bureaucracies. U.S. intelligence agencies are mapping the world's “ungoverned spaces.” The Pentagon has turned its regional Combatant Commands into platforms to head off state failure and address its spillover effects. The new Quadrennial Diplomacy and Development Review completed by the State Department and the U.S. Agency for International Development depicts fragile and conflict-riddled states as epicenters of terrorism, proliferation, crime and disease.¶ Yet such preoccupations reflect more hype than analysis. U.S. national security officials would be better served — and would serve all of us better — if they turned their strategic lens toward stronger developing countries, from which transnational threats are more likely to emanate.

# Warming Advantage

## Turn – OTEC Increases Warming

#### OTEC hurts ocean Bio-D and increases warming – Warms oceans and is legally constrained

International Space University 05 [International Space University masters study, multiple graduate student contributors: Christophe Accadia (EUMETSAT), Philippe Achilleas (ISU Faculty), Shahram Ariafar (ISU MSS05 Student), Jacques Arnould (Centre National d’Études Spatiales), Ivan Bekey (Bekey Designs, Inc), Jim Burke (NASA Jet Propulsion Laboratory (retired)), David Chon (Freelance Artist), Erik Clacey (ISU MSS05 Student), Filippo de Rose (EUMETSAT), John J. Egan (ISU)• Fabian Eilingsfeld (PRICE Systems)• Macha Ejova (ISU Teaching Associate)• John Farrow (ISU Resident Faculty)• Yasuyuki Ikegami (Saga University)• Joachim Köppen (Observatoire Astronomique de Strasbourg)• Nicolas Moncussi (ISU staff)• Walter Peeters (ISU Resident Faculty)• Dickson So (Ryerson University)• Patrick Takahashi (Hawaii Natural Energy Institute, University of Hawaii)• Nikolai Tolyarenko (ISU Resident Faculty)• Luis A. Vega (Pacific International Center for High Technology Research)• Dalibor Vukicevic (École Nationale Supérieure de Physique de Strasbourg), Masters Program 2004/2005, "Space Aid forOcean Thermal Energy Conversion SAOTEC Final Report," isulibrary.isunet.edu/opac/doc\_num.php?explnum\_id=118 accessed 10-25-12]cd

In addition to the conventional OTEC plant facilities, SAOTEC power plants will not only affect local¶ environment, but may furthermore have global impacts on environmental parameters. For space-aided OTEC¶ plants, a solar reflector will heat the sea surface temperature up to 60°C. This will not only affect the maritime¶ environment (i.e. flora and fauna) but might also contribute to global warming by heating the atmosphere.¶ The illumination of coastal SAOTEC plants by a solar reflector may cause a local, environmental disturbance¶ of the 24 hour day/night cycle of resident people, animals, plants and micro organisms (see 4.2.3). Countries¶ and governments planning to build a coastal SAOTEC power plant will have to consider and take precautions¶ to prevent threats to land-based activities, for both human health and well-being and the integrity of coastal¶ and marine ecosystems as well as the biodiversity.¶ There are three major legal documents which are applicable to the SAOTEC development and operational¶ phase:¶  The Law of the Sea Convention (1982)¶  The Washington Declaration on Protection of the Marine Environment from Land Based Activities (1995)¶  The Convention on Biological Diversity (1992)¶ The Law of the Sea Convention proclaims that States are responsible to ensure that activities under their¶ jurisdiction or control do not pollute another State’s environment27. Off-shore water SAOTEC plants will use¶ Solar Reflectors to heat a delimited sea surface area in order to increase its temperature gradient to gain a¶ proper amount of energy. Even if a high reflector stabilization and precision pointing capability is required to¶ operate space-aided OTEC plants, a seawater temperature increase will not only strictly occur on the plant¶ facility area, but will also raise the temperature of the surrounding water area. Habitats of sea organisms and¶ microorganisms will be affected and species might be extruded or displaced by other new species or alien¶ organisms. States are required to prevent these occurrences according to article 19628:¶ “States shall take all measures necessary to prevent, reduce and control pollution of the marine environment¶ resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental¶ introduction of species, alien or new, to a particular part of the marine environment, which may cause¶ significant and harmful changes there to”.¶ More specifically, environmental assessment and monitoring will be necessary to prevent harmful changes to¶ the marine environment29.”¶ The Washington Declaration on Protection of the Marine Environment from Land Based Activities (1995)¶ declares its commitment to protect and preserve the marine environment from the impacts of land-based¶ activities. But environment and biological biodiversity is not limited to plants, animals, microorganisms and¶ their ecosystems. The Convention on Biological Diversity 1992 recognizes that biological diversity is also¶ about people and their need for food security, medicine, fresh air and water, and a clean, healthy environment¶ in which to live. Besides producing energy to cover local energy demands, OTEC plants will also provide¶ desalinated water. OTEC plants might offer a safe and environmental friendly alternative to supply populated¶ areas with the produced water. Natural water deficiency can be compensated and biological diversity can be¶ maintained even if a local disturbance of maritime or land-based environment occurs.¶ The United Nations Framework Convention on Climate Change [United Nations 1992] recognizes that all¶ countries, especially developing countries, need access to the resources required to achieve sustainable social¶ and economic development. In order for the developing countries to progress towards that goal, their energy¶ consumption will grow. Taking into account the international needs for achieving greater energy efficiency¶ and for controlling greenhouse gas emissions in general, SAOTEC facilities can contribute to clean energy¶ production by using renewable energy source and avoiding the emission of greenhouse gases at the same time.

## Warming Inevitable

#### Warming inevitable- too late and china prevents

Mims ’12 (Christopher Mims, 3-26-2012, “Climate scientists: It’s basically too late to stop warming,” Grist, http://grist.org/list/climate-scientists-its-basically-too-late-to-stop-warming/

If you like cool weather and not having to club your neighbors as you battle for scarce resources, now’s the time to move to Canada, because the story of the 21st century is almost written, reports Reuters. Global warming is close to being irreversible, and in some cases that ship has already sailed. Scientists have been saying for a while that we have until between 2015 and 2020 to start radically reducing our carbon emissions, and what do you know: That deadline’s almost past! Crazy how these things sneak up on you while you’re squabbling about whether global warming is a religion. Also, our science got better in the meantime, so now we know that no matter what we do, we can say adios to the planet’s ice caps. For ice sheets — huge refrigerators that slow down the warming of the planet — the tipping point has probably already been passed, Steffen said. The West Antarctic ice sheet has shrunk over the last decade and the Greenland ice sheet has lost around 200 cubic km (48 cubic miles) a year since the 1990s. Here’s what happens next: Natural climate feedbacks will take over and, on top of our prodigious human-caused carbon emissions, send us over an irreversible tipping point. By 2100, the planet will be hotter than it’s been since the time of the dinosaurs, and everyone who lives in red states will pretty much get the apocalypse they’ve been hoping for. The subtropics will expand northward, the bottom half of the U.S. will turn into an inhospitable desert, and everyone who lives there will be drinking recycled pee and struggling to salvage something from an economy wrecked by the destruction of agriculture, industry, and electrical power production. Water shortages, rapidly rising seas, superstorms swamping hundreds of billions of dollars’ worth of infrastructure: It’s all a-coming, and anyone who is aware of the political realities knows that the odds are slim that our government will move in time to do anything to avert the biggest and most avoidable disaster short of all-out nuclear war. Even if our government did act, we can’t control the emissions of the developing world. China is now the biggest emitter of greenhouse gases on the planet and its inherently unstable autocratic political system demands growth at all costs. That means coal.

## No Impact to Warming

#### Doomsday warming predictions are false.

**Aikman**, **11**—Amos, the Australian Staff Reporter, “Climate forecasts 'exaggerated': Science journal” 11-15-11 http://www.theaustrali-an.com.au/news/health-science/climate-forecasts-exaggerated-science-journal/story-e6frg8y6-1226205464958 accessed date: 5-15-12 y2k

Dramatic forecasts of global warming resulting from a doubling of atmospheric carbon dioxide have been exaggerated, according toa peer-reviewed study by a team of international researchers. In the study, published today in the leading journal Science, the researchers found that while rising levels of CO2 would cause climatechange, the most severe predictions - some of which were adopted by the UN's peak climate body in its seminal 2007 report - hadbeen significantly overstated. The authors used a novel approachbased on modelling the effects of reduced CO2 levels on climate, which they compared withproxy-records of conditions during the last glaciation, to infer the effects of doubling CO2 levels. They concluded that current worst-case scenarios for global warming were exaggerated. "Now these very large changes (predicted for the coming decades) can be ruled out, and we have some room to breathe and time tofigure out solutions to the problem," the study's lead author, Andreas Schmittner, an associate professor at Oregon State University, said. [Politics muddies the debate](http://www.theaustralian.com.au/news/opinion/politics-muddies-the-debate/story-e6frg6zo-1226205386064) Scientists have struggled for many years to understand how to quantify "climate sensitivity" - how Earth will respond to projected increases in atmospheric carbon dioxide. In 2007, the UN's peak climate body, the Intergovernmental Panel on Climate Change, warned that a doubling of CO2 from pre-industrial levels would warm the Earth's surface by an average of 2C to 4.5C, although some studies have claimed the impact could be 10C or higher. Professor Schmittner said it had been very difficult to rule out these extreme "high-sensitivity" scenarios, which were very important for understanding risks associated with climate change. The study found high-sensitivity models led to a "runaway effect" under which the Earth would have been covered in ice during the last glacial maximum, about 20,000 years ago, when CO2 levels were much lower. "Clearly that didn't happen, and that's why we are pretty confident that these high climate sensitivities can be ruled out," he said. Professor Schmittner said taking his results literally, the IPCC's average or "expected" value of a 3C average temperature increase for a doubling of CO2 ought to be regarded as an upper limit. "Many previous climate-sensitivity studies have looked at the past only from 1850 through totoday, and not fully integrated paleoclimate data, especially on a global scale," he said. "If these paleoclimatic constraints apply to the future, as predicted by our model, the results imply less probability of extreme climatic change than previously thought."

#### No impact to warming—you should assign zero risk.

**Lindzen 9**—Richard S. Lindzen is the Alfred P. Sloan Professor of Atmospheric Sciences at Massachusetts Institute of Technology.

“Resisting climate hysteria” 8-14-09 <http://www.thepeoplesvoice.org/TPV3/Voices.php/2009/08/14/resisting-climate-hysteria> Accessed date: 7-15-12 y2k

Climate alarmists respond that some of the hottest years on record have occurred during the past decade. Given that we are in a relatively warm period, this is not surprising, but it says nothing about trends.Given that the evidence (and I have noted only a few of many pieces of evidence) strongly impliesthat anthropogenic warming has been greatly exaggerated, the basis for alarm due to such warming is similarly diminished. However, a really important point is that the case for alarm would still be weakeven if anthropogenic global warming were significant. Polar bears, arctic summer sea ice, regional droughts and floods, coral bleaching, hurricanes, alpine glaciers, malaria, etc. etc.all depend not on some global average of surface temperature anomaly, but ona huge number of regional variables including temperature, humidity, cloud cover, precipitation, and direction and magnitude of wind. The state of the ocean is also often crucial. Our ability to forecast any of these over periods beyond a few days is minimal (a leading modeler refers to it as essentially guesswork). Yet, eachcatastrophic forecastdepends on each of these being in a specific range.The odds of any specific catastrophe actually occurring are almost zero. This was equally true for earlier forecasts of famine for the 1980's, global cooling in the 1970's, Y2K and many others. Regionally, year to year fluctuations in temperature are over four times larger than fluctuations in the global mean. Much of this variation has to be independent of the global mean; otherwise the global mean would vary much more. This is simply to note that factors other than global warming aremore important to any specific situation. This is not to say that disasters will not occur; they always haveoccurred and this will not change in the future. Fighting global warming with symbolic gestureswill certainly not change this. However, history tells us that greater wealth and development can profoundly increase our resilience.

## Alt Causes to Warming

#### Other countries

**Dutta and Radner ‘12**(1. Prajit K. Dutta, Professor of Economics at Columbia University, Ph.D. in Economics from Cornell University, 2. Roy Radner, Professor of Business at New York University, Ph.D. in Mathematical Statistics from University of Chicago, distinguished fellow of the American Association for the Advancement of Science. (Prajit K. Dutta and Roy Radner: “Capital growth in a global warming model: will China and India sign a climate treaty?”, in Economic Theory Vol. 49 Iss. 2, 2012, p. 412, [http://pages.stern.nyu.edu/~rradner/publishedpapers2/113CapitalGrowth2012.pdf)](http://pages.stern.nyu.edu/~rradner/publishedpapers2/113CapitalGrowth2012.pdf)

Global climate change (CC) has emerged as the most important environmental issue of our times and, arguably, the one with the most critical long-run import. The observed rise in temperatures and variability of climate—the hot summers in Europe and the United States, the increased frequency of storms and hurricanes including Katerina, the melting of the polar ice-caps and glaciers on Asian mountain-tops threatening to dry the rivers that water that continent, the rise in sea levels—have all placed the problem center-stage. Since the climate change problem involves a classic “commons” that irrespective of the source of greenhouse gas emissions it is the common stock of it that affects the global climate, it can only be solved by an international effort at reaching agreement. For such an agreement to get carried out, however, it has to align the incentives of the signatory nations so that countries will, in fact, carry out their promises. At the same time, to meaningfully contain emissions an agreement has to be signed by all the major emitting countries, both developed and developing, and they have to commit to possibly deep cuts in emissions now and in the future. In other words for an agreement to be effective, it has to balance two competing forces—large enough cuts that make a difference to the climate that are yet “small enough” that countries will not cheat on their promises. And herein lies the rub. Since emissions are tied to economic activity, countries that are growing the fastest, such as China and India, are reluctant to sign onto emission cuts that they fear will compromise their growth. They point, moreover, to the “legacy effect” that the vast majority of existing greenhouse gas stock was accumulated in the last 100 years due to the industrialization of the West—and the per capita numbers— that per person their citizens contribute a fraction of the per capita emissions from the United States and the European Union. They argue, therefore, that they should not be asked to clean up a problem not of their making. On the other hand, leaving these countries out of a climate change treaty is simply not going to solve the problem since their growth path of emissions is high, China’s total emissions are already on par with the United States and unless the emissions of the developing world are reduced they will rapidly out-strip those of today’s developed economies and make it impossible to solve the climate change problem.

#### Other gases

Ecobridge ‘7 (http://www.ecobridge.org/content/g\_cse.htm

While carbon dioxide is the principal greenhouse gas, methane is second most important. According to the IPCC, Methane is more than 20 times as effective as CO2 at trapping heat in the atmosphere. US Emissions Inventory 2004 Levels of atmospheric methane have risen 145% in the last 100 years. [18] Methane is derived from sources such as rice paddies, bovine flatulence, bacteria in bogs and fossil fuel production. Most of the world’s rice, and all of the rice in the United States, is grown on flooded fields. When fields are flooded, anaerobic conditions develop and the organic matter in the soil decomposes, releasing CH4 to the atmosphere, primarily through the rice plants. US Emissions Inventory 2004 Water Vapor in the Atmosphere Increasing Water vapor is the most prevalent and most poweful greenhouse gas on the planet, but its increasing presence is the result of warming caused by carbon dioxide, methane and other greenhouse gases. (See NOAA's National Climate Data Center (NCDC) FAQ page) Water vapor holds onto two-thirds of the heat trapped by all the greenhouse gases.[129] As the Earth heats up relative humidity is able to increase, allowing the planet's atmosphere to hold more water vapor, causing even more warming, thus a positive feedback scenario. Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when its warmer), leading to more water vapor in the atmosphere, says the NCDC. There is much scientific uncertainty as to the degree this feedback loop causes increased warming, inasmuch as the water vapor also causes increased cloud formation, which in turn reflects heat back out into space. Nitrous oxide Another greenhouse gas is Nitrous oxide (N2O), a colourless, non-flammable gas with a sweetish odour, commonly known as "laughing gas", and sometimes used as an anaesthetic. Nitrous oxide is naturally produced by oceans and rainforests. Man-made sources of nitrous oxide include nylon and nitric acid production, the use of fertilisers in agriculture, cars with catalytic converters and the burning of organic matter. Nitrous oxide is broken down in the atmosphere by chemical reactions that involve sunlight. Deforestation After carbon emissions caused by humans, deforestation is the second principle cause of atmospheric carbn dioxide. (NASA Web Site) Deforestation is responsible for 20-25% of all carbon emissions entering the atmosphere, by the burning and cutting of about 34 million acres of trees each year. We are losing millions of acres of rainforests each year, the equivalent in area to the size of Italy. [22] The destroying of tropical forests alone is throwing hundreds of millions of tons of carbon dioxide into the atmosphere each year. We are also losing temperate forests. The temperate forests of the world account for an absorption rate of 2 billion tons of carbon annually. [3] In the temperate forests of Siberia alone, the earth is losing 10 million acres per year.

# Desalination Advantage

## No Water Wars

#### No water wars

Victor 7 [David G., Professor of Law – Stanford Law School and Director – Program on Energy and Sustainable Development, “What Resource Wars?”, The National Interest, 11-12, http://www.nationalinterest.org/Article.aspx?id=16020]

While there are many reasons to fear global warming, the risk that such dangers could cause violent conflict ranks extremely low on the list because it is highly unlikely to materialize. Despite decades of warnings about water wars, what is striking is that **water wars don't happen**-usually because countries that share water resources have a lot more at stake and armed conflict rarely fixes the problem. Some analysts have pointed to conflicts over resources, including water and valuable land, as a cause in the Rwandan genocide, for example. Recently, the UN secretary-general suggested that climate change was already exacerbating the conflicts in Sudan. But none of these supposed causal chains stay linked under close scrutiny-the conflicts over resources are usually symptomatic of deeper failures in governance and other primal forces for conflicts, such as ethnic tensions, income inequalities and other unsettled grievances. Climate is just one of many factors that contribute to tension. The same is true for scenarios of climate refugees, where the moniker "climate" conveniently obscures the deeper causal forces.

#### Water scarcity spurs cooperation – not conflict

Deen 7 [Thalif, Staff – IPS, “Water Wars A Myth”, Inter Press Service, 8-25, Lexis]

"Despite the potential problem, history has demonstrated that cooperation, rather than conflict, is likely in shared basins," UNESCO concludes. The Stockholm International Water Institute (SIWI) says that 10- to 20-year-old arguments about conflict over water are still being recycled. "Such arguments **ignore massive amounts of recent research** which shows that water-scarce states that share a water body tend to find cooperative solutions rather than enter into violent conflict," the institute says. SIWI says that during the entire "intifada" -- the ongoing Palestinian uprising against Israel in the occupied territories of West Bank and Gaza -- the only thing on which the two warring parties continued to cooperate at a basic level was their shared waters. "Thus, rather than reaching for arguments for the 'water war hypotheses,' the facts seem to support the idea that water is a uniting force and a potential source of peace rather than violent conflict." SIWI said. Ghosh, co-author of the UNDP study, pointed out several agreements which were "models of cooperation", including the Indus Waters Treaty, the Israel-Jordan accord, the Senegal River Development Organisation and the Mekong River Commission. A study sponsored by the Washington-based Woodrow Wilson International Centre for Scholars points that despite newspaper headlines screaming "water wars are coming!", these apocalyptic warnings fly in the face of history. "**No nations have gone to war** specifically **over** **water** resources **for thousands of years**. International water disputes -- even among fierce enemies -- are resolved peacefully, even as conflicts erupt over other issues," it says. The study also points out instances of cooperation between riparian nations -- countries or provinces bordering the same river -- that outnumbered conflicts by more than **two to one** between 1945 and 1999. Why? "Because water is so important, nations cannot afford to fight over it. Instead, **water fuels greater interdependence**. By coming together to jointly manage their shared water resources, countries can build trust and prevent conflict," argues the study, jointly co-authored by Aaron Wolf, Annika Kramer, Alexander Carius and Geoffrey Dabelko.

#### History and best studies prove

Wolf 99 [Aaron, Assistant Professor of Geography – University of Wisconsin, “Conflict and Cooperation Along International Waterways”, 11-1, http://www.gci.ch/GreenCrossPrograms/waterres/middleeast/wolf.html]

There are 268 international rivers, covering almost one half of the total land surface of the globe, and untold numbers of shared aquifers. Water has been a cause of political tensions between Arabs and Israelis; Indians and Bangladeshis; Americans and Mexicans; and all ten riparian states of the Nile River. Water is the only scarce resource for which there is no substitute, over which there is poorly-developed international law, and the need for which is overwhelming, constant, and immediate. As a consequence, "water" and "war" are two topics being assessed together with increasing frequency. This paper investigates the reality of historic water conflict and draws lessons for the plausibility of future "water wars." The datasets of conflict are explored for those related to water **only seven minor skirmishes are found in this century**; **no war has ever been fought over water**. In contrast, 145 water-related treaties were signed in the same period. These treaties, collected and catalogued in a computerized database along with relevant notes from negotiators, are assessed for patterns of conflict resolution. War over water seems neither strategically rational, hydrographically effective, nor economically viable. Shared interests along a waterway seem to overwhelm water's conflict-inducing characteristics. Furthermore, once cooperative water regimes are established through treaty, they turn out to be **tremendously resilient** over time, even between otherwise hostile riparians, and even as conflict is waged over other issues. These patterns suggest that the more valuable lesson of international water is as a resources whose characteristics tend to induce cooperation, and incite violence only in the exception.

#### Water conflicts won’t escalate to war- they lead to sharing not violence

[Schuyler Null](http://www.newsecuritybeat.org/author/snull/) , March 26, 2012

Global Water Security Calls for U.S. Leadership, Says Intelligence Assessment, Woodrow Wilson International Center for Scholars, http://www.newsecuritybeat.org/2012/03/global-water-security-calls-for-u-s-leadership-says-intelligence-assessment/

2) **Water-related state-on-state conflict is unlikely during the next 10 years.** Historically, water tensions have led to more water-sharing agreements than violent conflicts. However, we judge that as water shortages become more acute beyond the next 10 years, water in shared basins will increasingly be used as leverage; the use of water as a weapon or to further terrorist objectives also will become more likely beyond 10 years.

## No Resource Wars

#### Resource ‘conflicts’ don’t escalate – negotiations and compromise are the norm

Goldstone 2 (Jack, Professor of Public Policy – George Mason, “Population and Security: How Demographic Change Can Lead to Violent Conflict”, Journal of International Affairs, 56, Fall, p. 123)

Should we therefore dismiss the environment as a cause of conflict? No, although I believe we can be free of the fear that environmental decay will unleash wars and revolutions across the globe. Rather, what research has shown is that although environmental issues do cause international and domestic conflicts, they are of the kind that are **generally settled by negotiation and compromise** and do not lead to taking up arms. The reason for that is straightforward. Where the problem faced by two groups, or two nations, is over the degradation or depletion of an environmental resource, war neither solves the problem (it cannot make more of the resource) nor is it an economically efficient way to redistribute the resource (the costs of war almost invariably far outweigh the cost of gaining alternative resources or paying more for a share of the resource). For example, if two nations have a conflict over sharing river water—such as India and Bangladesh over the Ganges, Israel and Jordan over the river Jordan[ [12](http://web.ebscohost.com.ezp1.harvard.edu/ehost/detail?vid=3&hid=106&sid=b52b09a2-e198-49a9-9721-f665c7920b18%40sessionmgr109#bib12#bib12)] or Hungary and Slovakia over the Danube they may threaten violence but in fact are most likely to produce non-violent resolution through negotiation or arbitration rather than war (and indeed all of these conflicts led to treaties or international arbitration. The reason is that for one party to insist on all the water would in fact be a casus belli; and to risk a war to simply increase one's access to water is economically foolhardy. Throughout the world, the main use of freshwater (over three-quarters) is for irrigation to produce food. A reduction in water can be compensated either by adopting more efficient means of irrigation (drip rather than ditch); by switching to less water-intensive crops (dry grains rather than rice; tree crops rather than grains); or by importing food rather than producing it. All of these steps, though costly, are far, far, less costly than armed conflict. Thus for both the country with the ability to take more water and the country dependent on downstream flows, the issue will be how to use and negotiate use of the resource most efficiently; resort to war would inevitably be more costly than any gains that could be made from increased access to the resource. No nations have ever gone to war strictly over access to water; nor are any likely to do so in the future.

#### History proves – no resource wars

Victor 7 (David G., Professor of Law – Stanford Law School and Director – Program on Energy and Sustainable Development, “What Resource Wars?”, The National Interest, 11-12, http://www.nationalinterest.org/Article.aspx?id=16020)

If resource wars are actually rare-and when they do exist, they are part of a complex of causal factors-then much of the conventional wisdom about resource policies needs fresh scrutiny. A full-blown new strategy is beyond this modest essay, but here in the United States, at least three lines of new thinking are needed. First, the United States needs to think differently about the demands that countries with exploding growth are making on the world's resources. It must keep their rise in perspective, as their need for resources is still, on a per capita basis, much smaller than typical Western appetites. And what matters most is that the United States must focus on how to accommodate these countries' peaceful rise and their inevitable need for resources. Applied to China this means getting the Chinese government to view efficient markets as the best way to obtain resources-not only because such an approach leads to correct pricing (which encourages energy efficiency as resources become more dear), but also because it transforms all essential resources into commodities, which makes their particular physical location less important than the overall functioning of the commodity market. All that will, in turn, make resource wars even less likely because it will create common interests among all the countries with the greatest demand for resources. It will transform the resource problem from a zero-sum struggle to the common task of managing markets. Most policymakers agree with such general statements, but the actual practice of U.S. policy has largely undercut this goal. Saber-rattling about CNOOC's attempt to buy Unocal-along with similar fear-mongering around foreign control of ports and new rules that seem designed to trigger reviews by the Committee on Foreign Investment in the United States when foreigners try to buy American-owned assets-sends the signal that going out will also be the American approach, rather than letting markets function freely. Likewise, one of the most important actions in the oil market is to engage China and other emerging countries fully in the International Energy Agency-which is the world's only institution for managing the oil commodity markets in times of crisis-yet despite wide bipartisan consensus on that goal, nearly nothing is ever done to execute such a policy. Getting China to source commodities through markets rather than mercantilism will be relatively easy because Chinese policymakers, as well as the leadership of state enterprises that invest in natural resource projects, already increasingly think that way. **The sweep of history points against** classic **resource wars**. Whereas colonialism created long, oppressive and often war-prone supply chains for resources such as oil and rubber, most resources today are fungible commodities. That means it is almost always cheaper and more reliable to buy them in markets.

#### Market adjustments solve resources

National Post 8 [Canada – National Edition, “Don’t Panic”, 4-26, Lexis]

The trouble with doom-and-gloom predictions -- whether they be about oil shortages, food scarcity, water wars or population explosions --is that most are based on the linear extrapolation of short-term trends. If, say, rice prices rise, alarmists assume they will keep rising indefinitely at the same rate -- and then produce scary-looking graphs that show trend lines veering up into the wild-eyed blue yonder. But history shows that human adaptation invariably intervenes --especially in parts of the world that have the benefit of a market economy. Scarcity drives innovations that pull the world back from the brink. Consumers take high prices as their cue to consume less; producers take the same cue to produce more. A new equilibrium is reached, just as college microeconomics textbooks would predict. That's why we aren't losing any sleep over the latest predictions from Canadian Imperial Bank of Commerce chief economist Jeffrey Rubin, which were fronted prominently on Friday's National Post. New inventions, new oil discoveries and improvements in existing technologies will conspire to spare us Mr. Rubin's parade of horribles, which include $2.25-a-litre gasoline and tens of thousands of job losses in the auto-making sector. In a report entitled The Age of Scarcity, released on Thursday, Mr. Rubin predicts that by 2012, demand for oil, gas and diesel in the rest of the world will exceed that in OECD countries. As developing nations get richer, they will begin competing with the current industrialized world for diminishing resources. This will drive up the cost of everything from energy to food to computer components. Mr. Rubin predicts this will lead to the biggest economic disruption in North America since the 1973 oil crisis. But that same historical comparison suggests a reason Canadians should be suspicious of this ominous forecast: While the oil shortages of the 1970s displaced millions of assembly-line workers and led to a temporary slowdown of the North American economy, the adaptations they spurred ultimately made industry more efficient and ordinary people more prosperous. North American manufacturing is far more productive and energy-efficient now than it was 30 years ago, as well as producing far less pollution. (Many Canadians under 30, who have been reared on a constant diet of dire environmental claims, may have trouble believing this, but despite the rapid growth of our economy in the last three decades, smog is actually less toxic and our waters less polluted than in 1970.) In an interview with the National Post, Mr. Rubin fell into a common trap: He assumed growth is a zero-sum game, whereby someone must lose ground every time someone else gains it. "I think there will be fewer people on the road in North America in five years than there is right now," Mr. Rubin said on Thursday. "For everybody who's about to get on the road by buying a new Tata or a Chery car in the developing world, someone's going to have to get off the road in this part of the world. There's just not enough gasoline to go around." Anyone tempted to buy into this line of thinking would do well to remember the famous bet between Paul R. Ehrlich, author of the apocalyptic 1968 book The Population Bomb, and economist Julian Simon. Mr. Erlich predicted that by the late 1970s, the world would begin to run out of oil and metals, and that "wide-scale famine caused by declining food production" would cause hundreds of millions of deaths annually. Mr. Simon, on the other hand contended, that "natural resources are not finite in any serious way; they are created by the intellect of man, an always renewable resource." In 1980, he bet Mr. Ehrlich $1,000 that by 1990 a basket of any five commodities of his choosing would cost less than it had 10 years earlier. By the end-is-nigh thinking embraced by Mr. Ehrlich (and, to a lesser extent, Mr. Rubin), he should have won easily. Instead, Mr. Simon won. The five commodities chosen were, after inflation, 40% cheaper in 1990 than they had been a decade before. The same pattern is beginning to unfold in 2008. In just a few short months, rising prices for fuel have prompted the sort of market-driven energy efficiencies and environmental solutions that the green movement has failed to achieve through years of hectoring, regulating and legislating. Full-sized SUV sales have plummeted, home builders are designing smaller, low-consumption houses, airlines and railways are switching to more efficient planes and engines and car makers are scrambling to lighten their models. Thanks to just a 30% increase in pump prices, the automobile sector is likely to raise fleet fuel efficiency more than all the laws demanding higher standards passed in the past 35 years combined. There is no doubt that our society is changing because of the scarcity in food and fuel that Mr. Rubin highlights. But it defies the principles of economics to imagine that such scarcity will persist indefinitely. If there is one trend we can depend on, it is that the law of supply and demand will intervene to blunt the economic shocks that even the most prosperous nations must inevitably face.

## No Indo-Pak War

#### No Indo-Pak War

#### A) Deterrence

Tellis 2 [Ashley, Foreign Policy Research Institute, Orbis, Winter, p. 24-5]

In the final analysis, this situation is made objectively "meta-stable" by the fact that neither India, Pakistan, nor China has the strategic capabilities to execute those successful damage-limiting first strikes that might justify initiating nuclear attacks either "out of the blue" or during a crisis. Even China, which of the three comes closest to possessing such capabilities (against India under truly hypothetical scenarios), would find it difficult to conclude that the capacity for "splendid first strikes" lay within reach. Moreover, even if it could arrive at such a determination, the political justification for these actions would be substantially lacking given the nature of its current political disputes with India. On balance, therefore, it is reasonable to conclude that a high degree of deterrence stability, at least with respect to wars of unlimited aims, exists within the greater South Asian region.

#### B) Economics

Tellis 2 [Ashley, Foreign Policy Research Institute, Orbis, Winter, p. 19]

In any event, the saving grace that mutes the potential for exacerbated competition between both countries remains their relatively strong economic constraints. At the Pakistani end, these constraints are structural: Islamabad simply has no discretionary resources to fritter away on an open-ended arms race, and it could not acquire resources for this purpose without fundamentally transforming the nature of the Pakistani state itself—which transformation, if it occurs successfully, would actually mitigate many of the corrosive forces that currently drive Islamabad’s security competition with India. [21](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W5V-44R2RMN-3&_user=1111158&_handle=V-WA-A-W-AV-MsSAYVA-UUA-U-AAWWZYDZDV-AAWUWZYVDV-WUAYUYVAZ-AV-U&_fmt=full&_coverDate=10%2F01%2F2002&_rdoc=3&_orig=browse&_srch=%23toc%236580%232002%23999539998%23279210!&_cdi=6580&view=c&_acct=C000051676&_version=1&_urlVersion=0&_userid=1111158&md5=a57af48126ec154c39015e0e91157808" \l "fn22#fn22) At the Indian end, these constraints may be more self-imposed. New Delhi commands a large pool of national resources that could be siphoned off and reallocated to security instruments, but the current weaknesses of the central government’s public finances and its reform program, coupled with its desire to complete the technological modernization programs that have been underway for many decades, prevents it from enlarging the budgetary allocations for strategic acquisitions at will. [22](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6W5V-44R2RMN-3&_user=1111158&_handle=V-WA-A-W-AV-MsSAYVA-UUA-U-AAWWZYDZDV-AAWUWZYVDV-WUAYUYVAZ-AV-U&_fmt=full&_coverDate=10%2F01%2F2002&_rdoc=3&_orig=browse&_srch=%23toc%236580%232002%23999539998%23279210!&_cdi=6580&view=c&_acct=C000051676&_version=1&_urlVersion=0&_userid=1111158&md5=a57af48126ec154c39015e0e91157808" \l "fn23#fn23) With these constraints on both sides, future nuclearization in India and Pakistan is more likely to resemble an "arms crawl" than a genuine Richardson-type "arms race." The strategic capabilities on both sides will increase incrementally but slowly—and in India will have further to go because of its inferior capabilities compared to China’s. This slowness may be the best outcome from the viewpoint both of the two South Asian competitors and the United States.

#### C) Indian no-first-use and regional CBMs

Malik 3 [Mohan, The Stability Of Nuclear Deterrence In South Asia, Asian Affairs, Fall]

Regarding the technical requirements of stable deterrence, questions about command, control, and safety procedures continue to be raised. Both Pakistan and India claim to have maintained tighter controls over their arsenal-it is not in their own interests to see antistate actors gaining control of nuclear technology. Both India and Pakistan publicly have declared moratoriums on further nuclear tests, and India's adherence to no-first-use (NFU) posture and confidence-building measures-such as prenotification of missile tests and an agreement not to attack each other's nuclear installations-promotes crisis stability. Devin Hegarty argues that this is responsible behavior in stark contrast to U.S.-Soviet nuclear options, including "deployment of tens of thousands of nuclear warheads, bombers flying on 24-hour alert status, and the nuclear safety lapses that characterized the superpower arms race."25 Post-September 11 measures to promote greater security and control over nuclear weapons and materials have been accorded the topmost priority. India's nuclear arsenal is firmly under the control of civilian leadership, and the Pakistani army always has retained the real authority over its country's nuclear weapons, regardless of who is head of state. Pakistan's military chain of command appears intact despite internal turmoil and reshuffling at the top of the government.26 The United States reportedly is considering offering assistance to ensure the physical protection of sensitive nuclear assets with vaults, sensors, alarms, tamperproof seals and labels, and other means of protection, ensuring personnel reliability and secure transport of sensitive items.27

#### D) Fallout blow-back

Cohen 2 [Stephen, Senior Fellow @ Brookings, Nuclear Weapons and Nuclear War in South Asia: An Unknowable Future, May, http://www.brook.edu/views/speeches/cohens20020501.pdf]

There will be little likelihood of a preemptive attack by India against Pakistan or against India by Pakistan or China, in part because the numbers will make such an attack difficult, and in part because of mobile basing. In the India-Pakistan case, both sides will be worried about miscalculations and, as the numbers increase, the possibility of significant fallout on one’s own country from even a successful attack will increase, thus enhancing self-deterrence.

#### No extinction – impact is local

Dyer 2 [Gwynne, Ph.D. in War Studies – University of London and Board of Governors – Canada’s Royal Military College, “Nuclear War a Possibility Over Kashmir”, Hamilton Spectator, 5-24, Lexis]

For those who do not live in the subcontinent, the most important fact is that the damage would be largely confined to the region. The Cold War is over, the strategic understandings that once tied India and Pakistan to the rival alliance systems have all been cancelled, and no outside powers would be drawn into the fighting. The detonation of a hundred or so relatively small nuclear weapons over India and Pakistan would not cause grave harm to the wider world from fallout. People over 40 have already lived through a period when the great powers conducted hundreds of nuclear tests in the atmosphere, and they are mostly still here.

## No Asia War

#### Norms and economic interdependence check Asian war

Eskildsen 9 (Robert, Assistant Professor of Japanese History – Smith College “Whither East Asia? Reflections on Japan’s Colonial Experience in Taiwan”, The Asia-Pacific Journal, 3-22, http://japanfocus.org/-Robert-Eskildsen/2058)

The Meiji Restoration gave Japan the flexibility to pursue changes in the diplomatic status quo in East Asia, but the changes carried with them enormous risks. Domestically, Japan implemented radical institutional changes in order to conform more closely to Western norms, but doing so alienated important constituencies—farmers and samurai—and ultimately provoked armed rebellion. In foreign relations, Japan set out to learn the norms of Western diplomacy and use them to clarify a number of border relationships: with Russia in the north, Korea in the west, and China in the south—through a complex intermediate zone that included the Ryukyu archipelago and Taiwan. The process of redefining Japan’s borders in the west and south proved particularly troublesome and embroiled Japan in a sustained challenge to China’s diplomatic supremacy in East Asia that involved gunboat diplomacy, diplomatic coercion and armed conflict. Although it involved no clash with Chinese forces, the Taiwan Expedition was the earliest of these armed conflicts.Fast forward to the present, and we see that some of the issues that clouded the future of East Asia in the second half of the nineteenth century have contemporary analogues, although the geopolitical context has changed dramatically in the last 150 years. The biggest difference in the geopolitical context, of course, is that all the states in the region, with the possible exception of North Korea, are committed to operating within the international system and they have developed a measure of **economic interdependence**. These factors will **mitigate the possibility of armed conflict** in the future. On the other hand, nationalism, the legacies of Japanese imperialism, World War II and the Cold War, and China’s growing economic stature already exacerbate diplomatic conflicts, and they undoubtedly will continue to do so for many years to come. Against this geopolitical backdrop, three contemporary strategic conflicts stand out as particularly troublesome.

## No ME War

#### Middle East conflict won’t escalate – leaders won’t get involved

Maloney 7 (Suzanne, Senior Fellow – Saban Center for Middle East Policy, Steve Cook, Fellow – Council on Foreign Relations, and Ray Takeyh, Fellow – Council for Foreign Relations, “Why the Iraq War Won’t Engulf the Mideast”, International Herald Tribune, 6-28, http://www.brookings.edu/views/op-ed/maloney20070629.htm)

Yet, **the Saudis, Iranians, Jordanians, Syrians, and others are very unlikely to go to war** either to protect their own sect or ethnic group or to prevent one country from gaining the upper hand in Iraq. The reasons are fairly straightforward. First, Middle Eastern leaders, like politicians everywhere, are primarily interested in one thing: self-preservation. Committing forces to Iraq is an inherently risky proposition, which, if the conflict went badly, could threaten domestic political stability. Moreover, most Arab armies are geared toward regime protection rather than projecting power and thus have little capability for sending troops to Iraq. Second, there is cause for concern about the so-called blowback scenario in which jihadis returning from Iraq destabilize their home countries, plunging the region into conflict. Middle Eastern leaders are preparing for this possibility. Unlike in the 1990s, when Arab fighters in the Afghan jihad against the Soviet Union returned to Algeria, Egypt and Saudi Arabia and became a source of instability, Arab security services are being vigilant about who is coming in and going from their countries. In the last month, the Saudi government has arrested approximately 200 people suspected of ties with militants. Riyadh is also building a 700 kilometer wall along part of its frontier with Iraq in order to keep militants out of the kingdom. Finally, **there is no precedent for Arab leaders to commit forces to conflicts in which they are not directly involved**. The Iraqis and the Saudis did send small contingents to fight the Israelis in 1948 and 1967, but they were either ineffective or never made it. In the 1970s and 1980s, Arab countries other than Syria, which had a compelling interest in establishing its hegemony over Lebanon, never committed forces either to protect the Lebanese from the Israelis or from other Lebanese. The civil war in Lebanon was regarded as someone else's fight.

# A2: Add-Ons

## A2: Heg Add-On

### Doesn’t Deter War

#### Heg doesn’t deter war

Layne 97 [Christopher, Visiting Professor – Naval Postgraduate School, From Preponderance to Offshore Balancing]

Two critical objections could be lodged against an offshore balancing grand strategy: an offshore balancing strategy would increase—not lower—the risk of U.S. involvement in a major war, and the strategy of preponderance should not be abandoned because its benefits exceed its costs. Advocates of preponderance believe it is ifiusory to think that the United States can disengage from international commitments, because it inevitably would be drawn into major wars even if initially it tried to remain aloof. The example of Europe is frequently invoked: whenever a major European war breaks out, it is said, the United States invariably is compelled to intervene. Preponderance’s advocates also claim that U.S. security commitments in Europe and East Asia are a form of insurance: it is cheaper and safer for the United States to retain its security commitments and thereby deter wars from happening than to stand on the sidelines only to be compelled to intervene later under what presumably would be more dangerous conditions. Yet this argument is **unsupported by the historical record**, and it is not evident that the strategy of preponderance will in fact minimize the risk of U.S. involvement in future wars.

#### Internal conflicts drive wars – heg can’t solve

Conry 97 [Barbara, Foreign Policy Analyst – Cato, Policy Analysis No. 267, 2-5, “U.S. ‘Global Leadership’: A Euphemism for World Policeman,” http://www.cato.org/pubs/pas/pa-267.html]

Other proponents of U.S. political and military leadership do not point to particular benefits; instead, they warn of near-certain disaster if the United States relinquishes its leadership role. Christopher paints a bleak picture: Just consider what the world would be like without American leadership in the last two years alone. We would have four nuclear states in the former Soviet Union, instead of one, with Russian missiles still targeted at our homes. We would have a full-throttled nuclear program in North Korea; no GATT agreement and no NAFTA; brutal dictators still terrorizing Haiti; very likely, Iraqi troops back in Kuwait; and an unresolved Mexican economic crisis, which would threaten stability at our border. [55] Gingrich has pronounced a future without American leadership "a big mess." [56]And former British prime minister Margaret Thatcher has warned, What we are possibly looking at in 2095 [absent U.S. leadership] is an unstable world in which there are more than half a dozen "great powers," each with its own clients, all vulnerable if they stand alone, all capable of increasing their power and influence if they form the right kind of alliance, and all engaged willy-nilly in perpetual diplomatic maneuvers to ensure that their relative positions improve rather than deteriorate. In other words, 2095 might look like 1914 played on a somewhat larger stage. [57] In other words, if America abdicates its role as world leader, we are condemned to repeat the biggest mistakes of the 20th century--or perhaps do something even worse. Such thinking is **seriously flawed**, however. First, to assert that U.S. leadership can stave off otherwise inevitable global chaos **vastly overestimates** the power of any single country to influence world events. The United States is powerful, but it still can claim only 5 percent of the world's population and 20 percent of world economic output. Moreover, regardless of the resources Americans might be willing to devote to leading the world, today's problems often **do not lend themselves well to external solutions**. As Maynes has pointed out, Today, the greatest fear of most states is not external aggression but internal disorder. The United States **can do little** about the latter, whereas it used to be able to do a great deal about the former. In other words, the coinage of U.S. power in the world has been devalued by the change in the international agenda. [58] Indeed, many of the foreign policy problems that have confounded Washington since the demise of the Soviet Union are the kinds of problems that are likely to trouble the world well into the next century. "Failed states," such as Somalia, may not be uncommon. But, as the ill-fated U.S. and UN operations in that country showed, there is **very little** that outside powers can do about such problems. External powers usually lack the means to prevent or end civil wars, such as those in Rwanda and the former Yugoslavia, unless they are willing to make a tremendous effort to do so. Yet those types of **internecine conflicts are** likely to be one of **the primary sources of international disorder** for the foreseeable future. Despite the doomsayers who prophesy global chaos in the absence of U.S. leadership, however, Washington's limited ability to dampen such conflicts is not cause for panic. Instability is a **normal feature** of an international system of sovereign states, which the United States can tolerate and has tolerated for more than two centuries. If vital American interests are not at stake, instability itself becomes a serious problem only if the United States blunders into it, as it did in Somalia and Bosnia. [59]

### Heg Resilient

#### Heg is resilient

Wohlforth 7 [William, Professor of Government – Dartmouth College, “Unipolar Stability”, Harvard International Review, Spring, http://hir.harvard.edu/articles/1611/3/]

US military forces are stretched thin, its budget and trade deficits are high, and the country continues to finance its profligate ways by borrowing from abroad—notably from the Chinese government. These developments have prompted many analysts to warn that the United States suffers from “imperial overstretch.” And if US power is overstretched now, the argument goes, unipolarity can hardly be sustainable for long. The problem with this argument is that it fails to distinguish between actual and latent power. One must be careful to take into account both the level of resources that can be mobilized and the degree to which a government actually tries to mobilize them. And how much a government asks of its public is partly a function of the severity of the challenges that it faces. Indeed, one can never know for sure what a state is capable of until it has been seriously challenged. Yale historian Paul Kennedy coined the term “imperial overstretch” to describe the situation in which a state’s actual and latent capabilities cannot possibly match its foreign policy commitments. This situation should be contrasted with what might be termed “self-inflicted overstretch”—a situation in which a state lacks the sufficient resources to meet its current foreign policy commitments in the short term, but has untapped latent power and readily available policy choices that it can use to draw on this power. This is arguably the situation that the United States is in today. But the US government has not attempted to extract more resources from its population to meet its foreign policy commitments. Instead, it has moved strongly in the opposite direction by slashing personal and corporate tax rates. Although it is fighting wars in Afghanistan and Iraq and claims to be fighting a global “war” on terrorism, the United States is not acting like a country under intense international pressure. Aside from the volunteer servicemen and women and their families, US citizens have not been asked to make sacrifices for the sake of national prosperity and security. The country could clearly devote a greater proportion of its economy to military spending: today it spends only about 4 percent of its GDP on the military, as compared to 7 to 14 percent during the peak years of the Cold War. It could also spend its military budget more efficiently, shifting resources from expensive weapons systems to boots on the ground. Even more radically, it could reinstitute military conscription, shifting resources from pay and benefits to training and equipping more soldiers. On the economic front, it could raise taxes in a number of ways, notably on fossil fuels, to put its fiscal house back in order. No one knows for sure what would happen if a US president undertook such drastic measures, but there is nothing in economics, political science, or history to suggest that such policies would be any less likely to succeed than China is to continue to grow rapidly for decades. Most of those who study US politics would argue that the likelihood and potential success of such power-generating policies depends on public support, which is a function of the public’s perception of a threat. And as unnerving as terrorism is, there is nothing like the threat of another hostile power rising up in opposition to the United States for mobilizing public support. With **latent power** in the picture, it becomes clear that unipolarity might have more built-in **self-reinforcing mechanisms** than many analysts realize. It is often noted that the rise of a peer competitor to the United States might be thwarted by the counterbalancing actions of neighboring powers. For example, China’s rise might push India and Japan closer to the United States—indeed, this has already happened to some extent. There is also the strong possibility that a peer rival that comes to be seen as a threat would create strong incentives for the United States to end its self-inflicted overstretch and **tap** potentially **large wellsprings of** latent **power**.

## A2: China Add-On

### No China War

#### History proves no risk of China war – their cards are all hype

Dyer 9 [Gwynne, Ph.D. in War Studies – University of London and Board of Governors – Canada’s Royal Military College, “China Unlikely to Engage in Military Confrontation”, Jakarta Post, 4-29,

http://www.thejakartapost.com/news/2005/03/12/china-unlikely-engage-military-confrontation.html]

Given America's monopoly or huge technological lead in key areas like stealth bombers, aircraft carriers, long-range sensors, satellite surveillance and even infantry body armor, Goss's warning is misleading and self-serving. China cannot project a serious military force even 200 miles (km) from home, while American forces utterly dominate China's ocean frontiers, many thousands of miles (kilometers) from the United States. But the drumbeat of warnings about China's ""military build-up"" continues. Just the other week U.S. Defense Secretary Donald Rumsfeld was worrying again about the expansion of the Chinese navy, which is finally building some amphibious landing ships half a century after Beijing's confrontation with the non-Communist regime on the island of Taiwan began. And Senator Richard Lugar, head of the Senate Foreign Relations Committee, warned that if the European Union ends its embargo on arms sales to China, the U.S. would stop military technology sales to Europe. It will come as no surprise, therefore, that the major U.S. defense review planned for this year will concentrate on the rising ""threat"" from China, or that this year for the first time the joint U.S.-Japanese defense policy statement named China as a ""security concern"", or that the Taiwan government urged the ""military encirclement"" of China to prevent any ""foreign adventures"" by Beijing. It comes as no surprise -- but it still makes no sense. China's defense budget this year is 247.7 billion yuan: Around US$30 billion at the official exchange rate. There are those in Washington who will say that it's more like $60 billion in purchasing power, but then there used to be ""experts"" who annually produced hugely inflated and frightening estimates of the Soviet defense budget. Such people will always exist: to justify a big U.S. defense budget, you need a big threat. It's true that 247.7 billion yuan buys an awful lot of warm bodies in military uniform in the low-wage Chinese economy, but it doesn't actually buy much more in the way of high-tech military systems. It's also true that the Chinese defense budget has grown by double-digit increases for the past fourteen years: This year it's up by 12.6 percent. But that is not significantly faster than the Chinese economy as a whole is growing, and it's about what you have to spend in order to convert what used to be a glorified peasant militia into a modern military force. It would be astonishing if China chose NOT to modernize its armed forces as the rest of the economy modernizes, and the end result is not going to be a military machine that towers above all others. If you project the current growth rates of military spending in China and the United States into the future, China's defense budget catches up with the United States about the same time that its Gross Domestic Product does, in the late 2030s or the early 2040s. As to China's strategic intentions, the record of the past is reassuring in several respects. China has almost never been militarily expansionist beyond the traditional boundaries of the Middle Kingdom (which do include Tibet in the view of most Chinese), and its border clashes with India, the Soviet Union and Vietnam in the first decades of Communist rule generally ended with a voluntary Chinese withdrawal from the disputed territories. The same moderation has usually applied in nuclear matters. The CIA frets that China could have a hundred nuclear missiles targeted on the United States by 2015, but that is actually evidence of China's great restraint. The first Chinese nuclear weapons test was forty years ago, and by now China could have thousands of nuclear warheads targeted on the U.S. if it wanted. (The United States DOES have thousands of nuclear warheads that can strike Chinese targets.) The Beijing regime is obsessed with economic stability, because it fears that a severe downturn would trigger social and political upheaval. The last thing it wants is a military confrontation with its biggest trading partner, the United States. It will go on playing the nationalist card over Taiwan to curry domestic political favor, but there is no massive military build-up and no plausible threat of impending war in East Asia.

## A2: Coral Reefs Add-On

### Environment Resilient

#### Environment is resilient

Easterbrook 95 [Gregg, Distinguished Fellow – Fullbright Foundation, A Moment on Earth, p. 25]

In the aftermath of events such as Love Canal or the Exxon Valdez oil spill, every reference to the environment is prefaced with the adjective "fragile." "Fragile environment" has become a welded phrase of the modern lexicon, like "aging hippie" or "fugitive financier." But the notion of a fragile environment is profoundly wrong. Individual animals, plants, and people are distressingly fragile. **The environment** that contains them **is** close to **indestructible**. The living environment of Earth has survived ice ages; bombardments of cosmic radiation more deadly than atomic fallout; solar radiation more powerful than the worst-case projection for ozone depletion; thousand-year periods of intense volcanism releasing global air pollution far worse than that made by any factory; reversals of the planet's magnetic poles; the rearrangement of continents; transformation of plains into mountain ranges and of seas into plains; fluctuations of ocean currents and the jet stream; 300-foot vacillations in sea levels; shortening and lengthening of the seasons caused by shifts in the planetary axis; collisions of asteroids and comets bearing far more force than man's nuclear arsenals; and the years without summer that followed these impacts. Yet hearts beat on, and petals unfold still. Were the environment fragile it would have expired many eons before the advent of the industrial affronts of the dreaming ape. **Human assaults** on the environment, though mischievous, **are** **pinpricks** compared to forces of the magnitude nature is **accustomed to resisting**.

#### Long time-frame

Kay 1 [Jane, “Study Takes Historical Peek at Plight of Ocean Ecosystems”, San Francisco Chronicle, 7-26, Lexis]

The collapse of ecosystems often occur over a **long period**. In one example, when Aleut hunters killed the Alaskan sea otter about **2,500 years ago**, the population of their natural prey, the sea urchin, grew larger than its normal size. In turn, the urchins grazed down the kelp forests, important habitat for a whole host of ocean life. Then, when fur traders in the 1800s hunted the otters and sea cows almost to extinction, the kelp forests disappeared and didn't start to regenerate until the federal government protected the sea otters in the 20th century. In California, the diversity of spiny lobsters, sheephead fish and abalone kept down the urchin numbers. At present in Alaska, the kelp beds are declining again in areas where killer whales are preying on sea otters. Biologists think the killer whales switched to otters for food because there are fewer seals and sea lions to eat.

### Collapse Inevitable

#### Environmental collapse inevitable because of past pollution

Myers 97 (Norman, Visiting Fellow of Green College – Oxford University and Senior Fellow – World Wildlife Fund, Biodiversity II, Ed. Reaka-Kudla and Wilson, p. 135-136)

While formulating our responses to the mass extinction crisis, we need to bear in mind the length of time still available to us. The critical criterion for our efforts is not whether we are doing far more than before, but whether it will be enough—and that in turn raises the question of “enough by when?” How soon might we cross a threshold after which our best efforts could prove to be of little avail? Of course, not all habitats are going to be destroyed outright within the immediate future. But that is hardly the point. What looks set to eliminate many if not most species in the long run will be the “fragmentation effect,” i.e., the break up of extensive habitats into small isolated patches that are too small to maintain their stocks of species into the indefinite future. This phenomenon has been widely analyzed through the theory of island biogeography, and appears to be strongly supported through abundant empirical evidence, albeit with a good number of variations on the general theme. True, the process of ecological equilibriation, with its delayed fall-out effects, will take an extended period to exert its full depletive impact; in some instances, it will be decades and even centuries before species eventually disappear. But the ultimate upshot, which is what we should be primarily concerned with, will be the same. Consider the environmental degradation that **already has occurred**. Through dynamic **inertia**, it will continue to exert an increasingly adverse effect for a good way into the future, **no matter** how vigorously we try to resist the process: **much** potential **damage is already “in the pipeline.”** An obvious example is acid rain, which will keep on inflicting injury on biotas by reason of pollutants already deposited though not yet causing apparent harm. Similarly, tropical forests will suffer desiccation through climatic changes induced by deforestation that already has taken place. Desertification will keep on expanding its impact through **built-in momentum**. Ozone-destroying CFCs now in the atmosphere will continue their work for a whole century even if we were to cease releasing them forthwith. There is enough global warming in store through past emissions of greenhouse gases to cause significant climatic change no matter how much we seek to slow it, let alone halt it. In light of this on-going degradation of the biosphere, let us suppose, for the sake of argument, that in the year 2000 the whole of humankind were to be removed from the face of the Earth in one fell swoop. Because of the many environmental perturbations already imposed, with their impacts persisting for many subsequent decades, gross biospheric impoverishment would continue and thus serve to eliminate further large numbers of species in the long term (Myers, 1990b).