



The GEC Feed The World Coalition (**GECFTWC**) was established to create a plan for the future of water, fish, agriculture and livestock needs in order to be able to sustain a growing World population. This plan will present the basic ideas of the GECFTWC model however this model will continue growing with the acquisition of new ideas, technologies and processes that will compliment and enhance the GECFTWC plan.

Stark contrasts are apparent between the availability of natural resources and the demands of billions of humans who require them for their survival. According to the Population Reference Bureau, each day almost a quarter-million people are added to the roughly 6.4 billion who already exist. Facts don't change simply because people refute them. The fact is that the World population on the date that this policy paper was initially crafted (July 26, 2010) stood at 6,856,034,919. According to the CIA, we add on average 211,000 people to the world population every day. Yet the stocks of natural resources that support human life-food, fresh water, quality soil, energy, and biodiversity-are being polluted, degraded, and depleted.

Global population has doubled during the last 45 years. If the present growth rate of 1.3 percent per year persists, the population will double again within a mere 50 years. Growth rates vary from one country or region to another. For example, China's present population of 1.4 billion, despite the governmental policy of permitting only one child per couple, is still growing at an annual rate of 0.6 percent. Although China recognizes its serious overpopulation problem and recently passed legislation strengthening the policy, its young age structure means that the number of Chinese will continue to increase for another 50 years. India, with nearly 1.1 billion people (living on approximately one-third the land of either the United States or China), has a current population growth rate of 1.7 percent per year. This translates to a doubling time of 41 years. Taken together, the populations of China and India constitute more than one-third of the total world population. In Africa, despite the AIDS epidemic, the populations of most countries also are expanding. The populations of Chad and Ethiopia, for example, are projected to double in 21 and 23 years, respectively.

But the problem is hardly confined to the developing world. The U.S. population- among the most heavily consuming in the world-is growing rapidly. Now standing at nearly 300 million, it has doubled during the past 60 years. The U.S. Bureau of the Census reported in 2003 that sustaining the current growth rate of about 1.1 percent per year will double the population to 600 million in less than 70 years.

Current United Nations estimates of population stabilization at about 9 billion people by 2050 are questionable, mainly because of the very young age structure of the current world population and the momentum it fosters. A large share of the population is concentrated within the 15-to-40 range, where reproductive rates are high. Even if all the people in the world adopted a policy of only two children per couple, it would take approximately 70 years before the world population would finally stabilize at about 12 billion, twice the current level.

The United States population on the date that this policy paper was crafted on stood at 309,742,501. Including one birth every seven(7) seconds. The 2000 census projected that the United States population would double to just over 600 million people by the year 2100.

The preface is simple. More people require more water, more food from the sea, land and livestock.

The average American uses 24 Acres per year for food, energy, living space and other resources. By the year 2100 with 300 million new Americans we will need three Earths to satisfy the needs of America alone.

Exploding new economies transforming class bases in India and China alone will cause most of these two countries populations to move into the middle class by the year 2100.

Middle class people consume more water, eat more meats, fish & vegetables.

China is now known as an economic superpower that has become the world hub for manufacturing. However the United Nations now finds deficiencies in accuracy with Chinas population numbers. It is estimated that the true population numbers in China is not just over 1 billion people but more like several billion people reside in that exploding nation. More people in a growing economy will require more food. Combine this statistic with the fact that the Chinese have illegally overfished the seas and we have a real problem for a growing world population.

Problems already exist in our World today in regards to the bottom billion of the World population. They do not have access to food or water. Encroaching deserts on population centers in Asia, the Middle East and Africa will put greater strains on agriculture and livestock needs for a growing world population. The GEC Feed The World Coalition asks two questions. One, in a World of finite resources, how are we going to feed a World population of 12.5 billion by the year 2100 and two, how are we going to take care of the Planet that sustains us now so that we can make a plan to provide water and food for a World population of 12.5 billion people and beyond?

The goal of the GEC Feed The World Coalition is to bring together International, federal, state, county and city governments, corporations, non government organizations, non profits, academia, economists, agriculture, aqua culture specialists, the livestock industry, the United Nations and a whole host of necessary partners that can finally make a plan to provide a more sustainable future for the water and food that we will need to survive on this Planet now and for future generations.

The GEC Feed The World Coalition begins it's journey in creating a plan for the future of water and food for the world by looking at new ideas, new green technologies, new processes and new ways of thinking. By combining this new way of thinking the GECFTWC will present a new dynamic in Green Job creation on multiple scales.

There are an estimated 80 million institutional, industrial and retail buildings in the built environment in the United States. With the GECFTWC model we will utilize the vacant buildings in urban environments and create Aqua Culture/aquaponic facilities that will nurture, raise and bring to market some of the most coveted commercial and gaming fish on the market today. GECFTWC will do this by taking existing buildings and properties in urban areas that have not been economically viable for years and creating new tax ratables for the cities in which they reside.

However, before becoming Aqua Culture facilities the buildings will be used as green jobs training hubs. Through the National Green Energy Council, a partner in the GECFTWC, and it's Green Jobs Corps™ many unemployed Americans will be trained in the areas of weatherization, energy efficiency and renewable energy. This will be facilitated by retrofitting each building for the Aqua Culture/Aquaponic facilities to be as weatherized and energy efficient as possible.

Some facilities may even have the ability of being powered by Bio Mass, Solar or Wind energy.

By utilizing these vacant buildings as new green job training centers for on the job training and the National Green Energy Councils influence as a World leader in the area of green energy it will allow GECFTWC to work with cities to become partners in new green job and new green economy creation. This partnership can come in many ways. Not limited to the following:

- Deed transfer – Sometimes to make the GECFTWC model to be financially feasible for investment in a community, it may be necessary for the city to donate the vacant building to the GECFTWC. It is the duty of GECFTWC to convince the local official the benefits of doing so and the new green jobs and new green economy that this donation can present.
- Property Tax Abatements
- Low Interest Loans or Bond Guarantees
- Master Redeveloper Designation
- Expedited Permitting
- Federal Grants
- State Grants
- Community Redevelopment Association Grants

The Aqua Culture facilities model works best in 55,000 square feet or greater. However, additional GECFTWC's partnerships adds new dynamics in the Aqua Culture/Aquaponic model. With these collaborations the GECFTWC model can cater from 55,000 square feet enclosed facility to exterior facilities that can be hundreds of acres.

The GECFTWC has chosen an academic partner in Florida Institute of Technology (FIT) in Melbourne, Florida. FIT has an existing Aqua Culture facility located in Vero Beach, Florida. FIT also has applied for a Federal Government grant of \$11 Million to redevelop the existing facility. The GECFTWC is looking toward FIT to assist in the vetting, research and development of new applicable technologies to not only the Aqua Culture model but also in areas of water, agriculture and livestock.

GEC Feed The World Coalition Modules

1. GEC Fish For The World

Approximately 20 per cent of the world's freshwater fish species have become extinct, threatened or endangered in recent decades.

Climate Change has caused the lowering of water levels in lakes and rivers globally. Lowering the level of a lake or river destroys its natural edge — the most important area of an aquatic ecosystem.

The Aral Sea basin shared by Afghanistan, Iran and five countries of the former Soviet Union was once the world's fourth largest lake. Excessive river diversions have caused it to lose half its area and three-fourths of its volume, while its surrounding wetlands have shrunk by 85 %...almost all fish and waterfowl species have been decimated and the fisheries have collapsed.

In European waters, almost 90% of fish stocks evaluated are overfished. Managing fish stocks sustainably is a legal obligation under the United Nations Convention on the Law of the Sea (UNCLOS) and has been given the deadline of no later than 2015 in the Johannesburg Plan of Implementation, that has been agreed by the European Union.

The scientists found that Europe will fail to reach this aim by decades: Rainer Froese, leading scientists for the study, confirms "With a business-as-usual approach, rebuilding of European stocks will take more than 30 years. The scientists found, even if fishing were halted in 2010, 22% of the stocks are so depleted that they cannot be rebuilt by 2015. With their failing to set fishing quotas at a level that prevents overfishing, European Union fisheries ministers act also in contradiction to the "precautionary approach, a legally binding principle of the European Union treaty.

Previous findings by Oceana show that Fishing Quotas adopted by European fisheries ministers significantly exceed the scientific recommendations. Over the last 20 years, 78% of scientific recommendations on TACs for European Union fish stocks have been continuously ignored. The scientific study, published on January 21, 2010 illustrates the consequences of the constant failures in fisheries management and points out the urgent need for a complete turnaround.

A reformed Common Fisheries Policy will come into force in 2013 and the reform process will be led by Maria Damanaki, designated as the new European Fisheries Commissioner.

More than 50% of the world's wetlands have been drained, and populations of inland water and wetland species have declined by 50 per cent between 1970 and 1999.

Taking a long-term view, aquaculture really continues to offer the only viable alternative to continued depletion of our natural fisheries. During the past three decades, aquaculture has expanded, diversified, intensified and made technological advances. The potential of this development to enhance local food security, alleviate poverty and improve rural livelihoods has been well recognized. Global leadership now recognizes the need for the aquaculture sector to continue development towards its full potential, making a net contribution to global food availability, domestic food security, economic growth, and trade and improved living standards.

Aquaculture must continue to proceed in a more environmentally conscious manner. Lessons must be learned from the failures of many aquaculture operations worldwide and sustainable solutions must be enacted. The intensification in the aquaculture effort worldwide over the last several decades has clearly exposed the risks associated with culturing aquatic animals. Without proper management, aquaculture can put a great deal of strain on the surrounding natural ecosystems. The high densities of organisms, high artificial feed inputs and the subsequent generation of heavy organic loads in the water are the primary sources of most of the environmental problems associated with aquaculture.

Environmental issues will continue to play an increasingly important role in the development of aquaculture projects worldwide. GECFTWC knows that sustainable solutions to these difficult issues do exist. These solutions, if properly implemented, will permit the industry to continue to flourish in a way that will be in harmony with nature.

Aquaculture, if done right, can put more seafood on more plates without harming the environment.

Aquaponics is the name given to the synergistic combination of aquaculture and hydroponics. The appeal of aquaponics is that in combining the two activities the potential negative aspects in each are dealt with in a viable and sustainable manner. In other words, the sum of the two when combined has greater benefits than the individual activities alone.

The process makes use of waste products from growing fish as a natural nutrient source for plants. Nutrient rich fish water from the fish area are pumped into the plant growing area. Whatever the type, plants growing around the system extract the nutrients from the water, nutrients that the fish provide. The plants clean the water of excess nutrients; the water is then oxygenated by simple means. This practice makes efficient use of what would otherwise be considered organic waste. There is minimum effluent from this type of farming. Plants and bacteria in the growing sea bed use nutrients from the fish effluent and in return purify the water for the benefit of the fish.

GECFTWC fish farming practices aim to strike a balance between three major components within the sustainable use and development model:

- Conservation of open water areas – protect relevant ecosystems so that wildlife can continue to use their habitats;
- Economic considerations – support the livelihood of fish farmers and attract newcomers, especially the next generation, to join this industry; and
- Social needs – produce fish products that are healthy and safe for consumption to meet the world’s demand for more "green" foodstuffs.

Through transforming the three captioned components into a premium value, fish farmers should receive higher economic returns as an incentive to continue the eco-friendly fish farm management practices and eventually the scheme should become economically self-sustainable. GECFTWC fish will be tasty, natural, healthy and safe for consumption. Most importantly the cultivating practices will have no harmful impact to the fish farm environment and also help conserve an ecologically important habitat for wildlife

The GECFTWC Fish For The World Model Has Six Key Principles:

1. Responsible siting of fish farms.
2. The use of sustainable sources of feed.
3. Minimizing the effects of marine pollutants.
4. Minimizing the wider ecosystem effects.
5. Optimal welfare standards and environmental management.
6. Continuous improvement and research

GEC Fish For The World believes that responsible management, incorporating environmental considerations within a robust and transparent framework is essential to achieve an environmentally sustainable fish farming industry. We aim to research, promote and encourage the adoption of environmentally responsible and sustainable practices within the mariculture industry that:

- Minimize adverse effects on local wildlife, habitats and landscapes from Pollution or poor siting;
- Utilize the best sustainable feed options available;
- Provide optimum protection of wild stocks from escapes associated with Fish-farms;
- Continues to work towards achieving optimal health and welfare of farmed species.

GECFTWC believes that adoption of these practices will help achieve a balance between the development and diversification of the aquaculture industry and the maintenance and / or recovery of marine ecosystem integrity.

We believe that many of the concerns associated with fish farming in open Sea systems (such as organic waste accumulation, degraded water quality, sea Lice and wild fish interactions, predator interaction and benthic biodiversity Impacts), can be minimized by selecting appropriate sitting areas for farms, within a wider Marine Spatial Planning framework.

We believe that fish feed should be manufactured from a combination of Environmentally sustainable marine and non-marine raw materials from independently certified sustainable sources, and from fish processing trimmings. Feed use should also be optimized to ensure wastage is minimized while food conversion ratios are maximized.

GECFTWC's aim is to promote the use of the most sustainable sources of raw materials available for inclusion in fish feeds, ensuring that the long-term sustainability of wild capture fisheries is achieved and maintained and wider ecosystem effects are identified and minimized.

GECFTWC will ensure that systems will be in place to ensure that feed wastage is minimized and feed uptake is maximized. Systems such as feedback loops, underwater camera's and experienced, diligent staff can ensure that the feed used is effectively utilized. By reducing feed wastage to a minimum immediate savings are made in raw material requirements and benthic impacts. The long term goal is to ensure that all farmed finfish are grown on diets whose components are sourced from independently certified sustainable supplies and whose diets maximize the benefits of fish meal and oil consumption whilst minimizing Ecosystem effects. By combining sustainable marine and non-marine raw materials to ensure that the greatest nutritional benefit is achieved in the most sustainable way possible and maximizing feed use, progress can be made to achieving this goal.

GECFTWC Aqua Culture Facilities will:

- Have a Containment Code of Practice either as part of their environmental Management System manual or as a separate document, within which the procedure for reporting, recording and minimizing escapes is outlined.
- Have in place stock recovery systems and systems to prevent the incursion of or remove farmed fish that have or are entering wild systems.
- Have appropriate security measures where there is a possibility of malicious damage and/or deliberate release of fish.

Have an Environmental Management System:

To ensure effective environmental management on a fish farm, a comprehensive Environmental Management System (EMS) will to be in place. The EMS will encompass a number of practices within the farming operation including, of particular interest to GECFTWC:

- Environmental Management Plan
- Regular independent monitoring against farming standards employed, both internal and external
- Veterinary Health Plan
- Containment Policy

The current environmental disaster caused by Beyond Petroleum (BP) in the Gulf Coast of the United States presents an ideal opportunity for the GECFTWC Fish For The World Module. Only the future will hold the answers to how the fishing industry will be affected by the large volumes of oil and dispersants released in the Gulf Coast areas however, even now there are many unemployed fishermen of the Gulf Coast region whose fishing livelihood from the sea will never return.

The GEC Fish For The World module will concentrate on Aquaculture/aquaponics facilities in these areas immediately. Combined with aquaponics, the GECFTWC will create truly sustainable facilities that will bring locally cultivated fish species and locally grown fruits and vegetables that can be utilized by both the local communities as well as create a new gross domestic product that can be shipped all over North America and the World.

Currently unemployed fishermen in the region can be retrained to easily become the new workforce for the Aqua Culture facilities. Meanwhile currently unemployed people in other sectors can be trained in weatherization techniques, energy efficiency retrofits and even some in renewable energy applications.

The previous catastrophes of both Hurricane Katrina and Rita in the region has created scores of vacant buildings throughout Louisiana, Alabama and Mississippi. GECFTWC will concentrate on working with city, parish and state leaders to understand the opportunity that the GECFTWC model can bring to bring immediate recovery to these hard hit regions while creating thousands of new green jobs and a new green economy.

2. GEC Water For The World

The availability of adequate supplies of fresh water for human direct use and agriculture is already critical in many regions, especially the Middle East and parts of North Africa where low rainfall is endemic. Surface waters, for instance, are often poorly managed, resulting in water shortages and pollution, both of which threaten humans and aquatic biota. Groundwater- rainfall lying in underground aquifers-is another vital source of water for agriculture; it too is often used profligately. Aquifers recharge very slowly, usually at rates of 0.1 to 0.3 percent per year, according to the UN Environment Programme. At these rates, groundwater resources must be carefully managed to prevent overuse and depletion, but this wisdom is often ignored. For example, in Tamil Nadu, India, groundwater levels dropped 25 to 30 meters during the 1970s because of excessive pumping for irrigation.

In Beijing, China, the groundwater level is falling at a rate of about 1 meter per year, while in Tianjin, China, it is dropping 4.4 meters per year. In the United States, groundwater overdraft is high, averaging 25 percent greater than replacement rates. The capacity of the Ogallala aquifer, which underlies parts of Nebraska, South Dakota, Colorado, Kansas, Oklahoma, New Mexico, and Texas, has decreased by 33 percent since about 1950. Withdrawal from the Ogallala is three times faster than its recharge rate. Aquifers in some parts of Arizona are being over pumped more than 10 times faster than the recharge rate.

Irrigation enables crop production in arid regions, provided there is an adequate source of fresh water and enough energy (generally fossil in origin) to pump and move the water. About 70 percent of the water removed from all sources worldwide is used solely for irrigation. Of this amount, about two-thirds is consumed by growing plants and is non-recoverable, i.e, lost to the hydrologic cycle via evapotranspiration. Irrigation is less water-efficient than rainfed watering of crops, and the limitations of surface and ground water resources for irrigation, its high economic costs, and the large energy inputs required will tend to limit future agricultural irrigation, especially in developing nations that cannot afford such expenditures.

Pollution is a major threat to maintaining ample fresh water resources. Although considerable water pollution has been documented in developed nations like the United States, the problem is of greatest concern in countries where water regulations are not rigorously enforced or do not exist. This is common in most developing countries, which (according to the World Health Organization) discharge 95 percent of untreated urban sewage directly into surface waters. For instance, of India's 3,119 towns and cities, only 209 have even partial sewage treatment facilities, and a mere eight possess full facilities.

Downstream, the polluted water is used for drinking, bathing, and washing. Water is the new oil – a precious commodity, increasingly harder to find, manage and distribute; and that supply is often subject to the whims of Mother Nature. Control of available water is subject to the whims of government. In some parts of the country, the availability of water is restricting the building of housing.

Some regions in the U.S. are learning the hard way – the Southeast is entering its third year of drought conditions. Lake Lanier, Atlanta's main source of water is over 13 feet below normal, despite recent rainfall.

Lake Superior contains 20% of all the fresh water on Earth. It is down 2 FT. or 12 Trillion Gallons.

Lake Mead in Nevada is down by 80 feet in seven years.

The average American uses 102 gallons per day showering.

It takes 39,000 gallons of water to make one automobile vehicle.

It takes 23 gallons of water to make one loaf of bread.

UNESCO has predicted that by 2020 water shortages will be a serious worldwide problem. The European Union has recently warned the world that it is in a global water crisis and has made the issue a priority for the World Summit on Sustainable Development.

While most global discussions seem to revolve around global warming and the inevitable impacts during the 21st century, the reality is that water is the immediate concern that deserves our attention. While the verdict on global warming will continue to be debated, we believe there are more imminent issues - lakes are shrinking more rapidly, shoreline erosion is more prevalent and is, in fact, accelerating and the depletion of rivers is inescapable.

Typically, we tend to reflect on needs and scarcity in times of hardship. Over the last quarter century, the United Nations, The World Bank and various independent think tanks have lead a quiet but forceful cry that went unheard until consecutive cataclysmic events, such as the Sumatran Tsunami and Hurricane Katrina, occurred. Add the monthly water contamination events that seemed to dominate China over the last year and the mounting news of corporate irresponsibility concerning the pollution of existing water supplies, and one has to strongly reflect on the state of the global water sector and the impact it is having.

The United Nations has reported that at least 1.5 billion people lack access to safe drinking water every day. More than 3.5 million people die each year from water-related pathogens.

Drinking water is essential for all body functions and life itself. Considering that our bodies are approximately 80% liquid and our brains are 90% water, understanding water's important role in the body can be a fountain of health. Water is the essential element in life needed to maintain good health and well-being. We need water to digest food and eliminate toxins and waste from our bodies. Water protects our cell tissue, regulates body temperature and transports oxygen and nutrients throughout our bodies. Water allows our bodies to heal and helps prevent disease and obesity. Water is the most important nutrient in our bodies. Of course, the quality of the water we drink directly impacts our body's life-supporting functions. Researchers agree pure water is the ultimate drink for life and health.

The world's water is constantly moving in what is called the water cycle or hydraulic cycle. This means that water locations change between the oceans, the atmosphere, rivers and lakes and below the ground, but the volume of water always remains constant. This means there is never going to be additional water made available to our planet. The significant difference is the negative impact that humans have had on the available water.

Only 1% of the earth's water is available as drinking water for humans and animals and that 1% is being contaminated by the industrial civilization in which we live. Pollutants such as physical & biological waste, chemicals, pesticides from agriculture, and pharmaceuticals have contaminated our water beyond the point where we are able to clean it. It's becoming more and more difficult to access good water.

The World Health Organization estimates that 80% of all known illness is caused by contaminated drinking water. According to United Nations the global consumption of water is doubling every 20 years due to the increase in population and by 2025 the expected demand for water will exceed 50% of the amount currently being used today. At that time almost two-thirds of the world's population will lack access to fresh drinking water.

With the increasing global population as well as the continued deterioration and contamination of fresh water resources, supplies of clean, safe drinking water will decrease by 1/3. Currently, there is not enough drinking water to satisfy demand and is destined to get worse as the population increases. Industry and agriculture will use up to 90% of all fresh water sources, pushing the price of food upwards. Water prices will escalate as fresh water resources diminish, while usage and demand increase.

The World Health Organization has warned that if nothing is done to increase present supplies of drinking water, wars will be fought over diminishing reserves of water during this century. Only 20% of the global population has access to drinkable running tap water and as of 2006, 90% of all the cities in the world still dump raw sewage into their fresh water supplies, making them unsafe for human consumption.

Water tables are falling from the over-pumping of groundwater in the bread baskets and rice bowls of central and northern China, northwest India, parts of Pakistan, much of the United States, North Africa, the Middle East, and the Arabian Peninsula. Farmers in these regions are pumping groundwater faster than nature is replenishing it.

No country in the world has a more acute water problem than China. The Peoples Republic of China ("PRC") has committed over \$128 billion in water infrastructure spending over the next five years.

China has over one fifth of the world's total population and just 7% of the fresh water on earth. The United Nations has identified China as one of the 13 countries with the lowest water per capita in the world. China's waters are so polluted they cannot support aquatic life, while the migration of individuals from the farming communities to the new industrial zones puts further stress on a country that suffers from both physical and economic water scarcity.

It is estimated that half of China's population consumes drinking water contaminated with animal and human waste that exceeds permissible levels on a daily basis, and that 33% of the workforce in industrial zones have an excessive absentee rate due to water-borne pathogens.

As Minister of Water Resources Wang Shucheng noted, "The price of China's economic boom is being paid in water." Two-thirds of China's 600 largest cities don't have enough water; half of these cities have polluted groundwater. Less than 15% of China's population has safe drinking water from a tap.

China is one of 13 countries with the lowest amount of water per capita. Presently 2/3 of China's largest cities do not have enough water while 1/2 of them have severely polluted ground water. Less than 15% of China's population has safe drinking tap water. Expanding populations mean up to 90% of the available water will be used for food production and of the remaining fresh water, 50% will be used for industry. Due to climate change and other mitigating factors, entire regions are fast becoming unsuitable for crop production, causing a physical and economic scarcity that will undoubtedly trigger shortages of both food and water.

India, in some areas, has critically poor water. More than 21 million wells have been drilled and still, they are drastically short of water for their growing population. 1000 children die daily in India alone due to water borne disease.

In the late 1990's, India's central pollution control board found that groundwater was unfit for drinking in all 22 major industrial zones it surveyed.

Even in a western nation such as the USA approximately one million people become ill due to drinking contaminated water and about 1000 die every year.

Pollution has reached many underground water sources throughout the world. In the USA, water contamination has increasingly become worse. According to the Associated Press, biological contamination, such as pharmaceuticals – (16 measurable) the likes of antibiotics, mood stabilizers, anti-depressants and sex hormones are showing up in the tap water of more than 60 million people. The shocking truth... drugs contaminate drinking water supplies of at least 41 million Americans, one in five Americans is drinking drug-tainted water daily.

60% of the most hazardous liquid waste in the United States—34 billion liters of solvents, heavy metals, and radioactive materials—is injected straight into deep groundwater via thousands of injection wells.

In the USA, groundwater withdrawal is more than 25% higher than the replenishment rate, resulting in a steady negative drain causing numerous aquifers to dry up completely. Many cities must pipe water in from hundreds of miles away. Los Angeles, CA. has to bring water in from 1000 miles away. Water shortages are definitely not limited to third world nations; the entire state of California is currently experiencing the worst drought in 30 years and there are many other states with similar water shortages.

The industries requiring the most water... are petroleum refining, food processing, metals, chemical processing, and pulp and paper... the industrial use of water... creates toxic and hazardous pollutants that renders waste water unfit for subsequent human consumption or use in the agricultural sector; these conditions can also permanently pollute aquifers. The expansion of industry to the developing world, in addition to local human contamination of fresh water supplies, is making it more difficult to maintain water quality.

Just in the Middle East alone, approximately \$117 billion is expected to be invested between 2005 and 2015, an increase of 59% over the previous decade according to Gulf Capital.

The spending acceleration can be pegged to growth in populations, expanding economies and the need for large-scale spending on new water projects and an inadequate investment in the existing infrastructure. It is anticipated that the region—including Egypt, Iran, Iraq—will be required to invest heavily in the water infrastructure sector just to satisfy demand and avoid the potential for social and economical uprisings.

The amount of available renewable water per person in Middle Eastern and North African countries is one-fifth of what it is in the rest of the world, and 80% of the countries fall below the international water scarcity threshold of 1,000 cubic meters (m³) per person per year.

The GEC Water For The World module will concentrate on new technologies and processes that can create better, more sustainable recovery, reclamation and production technologies.

One example is the use of Atmospheric Water Generators (AWG's) on both existing structures, new development as well as utility scale applications combines with renewable energy technologies.

AWG's can generate clean drinking water from the humidity in the atmosphere. AWG models can be as small as a water cooler, producing up to 7-10 gallons of water per day. To units that are roof top mounts on commercial structures that can produce several hundred gallons of fresh water per day. To utility scale models that can produce upwards of 25,000 gallons of fresh water per day.

AWG's will also be installed in all GEC Fish For The World Coalition Aquaculture facilities in order to create a more economical model that utilizes the surplus humidity levels in the aquaculture facilities to produce new water for both aqua culture and aquaponic areas.

Other existing technologies utilized by GEC Water For The World Coalition will be renewable energy powered desalinization units, reusable stainless steel and aluminum water bottles, carbon filtered water bottles and waterless toothbrushes.

3. GEC Agriculture For The World

Many human beings already suffer from hunger and/or malnourishment. The United Nations Food and Agricultural Organization (FAO) reports that the quantity of food produced per capita has been declining since 1984, based on available cereal grains, which make up about 80 percent of the world's food supply. Although grain yields per hectare in both developed and developing countries are still increasing, the rate of increase is slowing. According to the U.S. Department of Agriculture, U.S. grain yields increased at about 3 percent per year between 1950 and 1980, but since then the annual rate of increase for corn and other major other grains has been only about 1 percent. Yet the World Health Organization estimates that more than 3 billion people are malnourished (deficient in intake of calories, protein, iron, iodine, and/or vitamins A, B, C, and D). This is the largest number and proportion of malnourished people ever reported.

At the same time, cropland resources are under severe strain. FAO Food Balance Sheets show that more than 99.7 percent of human food (calories) comes from the terrestrial environment, while less than 0.3 percent comes from the oceans and other aquatic ecosystems. Of the total of 13 billion hectares of land area on Earth, cropland accounts for 11 percent, pastureland 27 per cent, forested land 32 percent, and urban lands 9 per cent. Most of the remaining 21 percent is unsuitable for crops, pasture, and/or forests because the soil is too infertile or shallow to support plant growth, or the climate and region are too cold, dry, steep, stony, or wet.

In 1960, when the world population numbered only 3 billion, approximately 0.5 hectare of cropland per capita was available, the minimum area considered essential for the production of a diverse, healthy, nutritious diet of plant and animal products like that enjoyed widely in the United States and Europe. But as the human population continues to increase and expand its economic activity and related artifacts, including transport systems and urban structures, vital cropland is being covered and lost from production.

Globally, available per-capita cropland is now about 0.23 hectare. In the United States, there is already about 0.4 hectare (1 acre) of land per person tied up in urban buildings and highways and the available cropland per capita has shrunk over the last 30 years or so to 0.5 hectare. In China, per-capita cropland has declined to 0.08 hectare from 0.11 hectare 25 years ago, due to continued population growth as well as extreme soil erosion and degradation. This relatively small amount of cropland provides the Chinese people a primarily vegetarian diet.

The United States produces 1,481 kilograms per year of agricultural products for each American, while the Chinese food supply averages only 785 kilograms per year per capita (mostly grains in both cases). Lester Brown of the Earth Policy Institute has suggested that by all available measurements the Chinese have reached or exceeded the limits of their agricultural system. The Chinese reliance on large inputs of fossil fuel-based fertilizers to compensate for shortages of arable land and severely eroded soils, combined with their limited fresh water supply, suggests severe problems looming ahead. Even now, China imports large amounts of grain from the United States (which also relies heavily on fossil inputs for agriculture) and other nations, and is expected to increase imports of grains in the near future.

The decline of per-capita cropland is aggravated by the degradation of soils. Throughout the world, current erosion rates are higher than ever. According to a study for the International Food Policy Research Institute, each year an estimated 10 million hectares of cropland worldwide are abandoned due to soil erosion and diminished production caused by erosion. Another 10 million hectares are critically damaged each year by salinization, in large part as a result of irrigation and/or improper drainage methods. This loss amounts to more than 1.3 percent of total cropland annually. Most of the additional cropland needed to replace yearly losses comes from the world's forest areas. The urgent need to increase crop production accounts for more than 60 percent of the massive deforestation now occurring worldwide.

Erosion losses are critical because topsoil renewal is extremely slow. It takes about 500 years for 2.5 centimeters (1 inch) of topsoil to reform under agricultural conditions. Soil erosion rates on cropland range from about 10 metric tons per hectare per year (t/ha/yr) in the United States to 40 t/ha/yr in China. During the past 30 years, the rate of soil loss throughout Africa has increased 20-fold. A 1996 study in India found that as much as 5,600 t/ha/yr of soil were lost under some arid and windy conditions. Some crops can be grown under artificial conditions using hydroponic techniques, but the cost (in energy and dollars) is approximately 10 times that of conventional agriculture. Such systems are neither affordable nor sustainable for the future.

In general, however, in what may be a harbinger of an approaching crunch, the International Fertilizer Organization reports that fertilizer production has declined by more than 17 percent since 1989, especially in the developing countries, because of fossil fuel shortages and resulting high prices. In fact, the projected global availability of fossil energy resources for fertilizers, not to mention all other purposes is discouraging.

During the 20th century, increased food production-supporting a period of unprecedented growth in the world population-depended on the availability of cheap fossil energy, primarily oil and natural gas. The consequent expansion of human needs and activities has been depleting the land, water, and biological resources that are essential for sustainable agricultural production. Already, more than 3 billion people in the world are malnourished, yet per-capita production of cereal grains, basic world foods, has continued to decline for the past 20 years, despite all the new biotechnologies.

As the world population continues to expand, all vital natural resources will have to be divided among increasing numbers of people and per-capita availability will decline to low levels. When this occurs, we believe that it will become quite difficult to maintain prosperity, a quality life, and even personal freedoms for those who already enjoy them, much less secure those benefits for the billions currently living without. Meeting this challenge will test humanity's resourcefulness and goodwill to the utmost.

The last century has seen the intensification, concentration and specialization of agriculture, relying upon new technologies of agricultural chemicals (fertilizers and pesticides), mechanization, and plant breeding (hybrids). In the past few decades, a move towards sustainability in agriculture has also developed, integrating ideas of socio-economic justice and conservation of resources and the environment within a farming system. This has led to the development of many responses to the conventional agriculture approach, including organic agriculture, aquaponics, urban agriculture, community supported agriculture, ecological or biological agriculture, integrated farming and holistic management, as well as an increased trend towards agricultural diversification.

Therefore, GECFTWC believes that our model incorporating Aquaponics with Aquaculture will be successful as a sustainable agricultural tool for the local restaurant and hospitality industry within the immediate areas of our facilities

4. GEC Livestock For The World

A 2006 United Nations report *Livestock's Long Shadow* –says that livestock is responsible for 18% of global greenhouse gas emissions.

The report showed that the animal agriculture sector is responsible for **18% of greenhouse gas emissions**, measured in carbon dioxide (CO₂) equivalent, higher than the share contributed by the transportation sector. This figure accounts for the animal agriculture sector's direct impacts as well as the impacts of feeding the world's approximately 63 billion farm animals. Specifically, animal agriculture accounts for:

9% of annual human-induced CO₂ emissions,

37% of methane (CH₄) emissions, which has more than 20 times the global warming potential of CO₂.

65% of nitrous oxide (N₂O) emissions, which has almost 300 times CO₂'s global warming potential.

The livestock industry aims to double its output globally by 2050 and farm animals, like every other living thing, need to eat. More than half the U.S. grain and nearly 40 percent of world grain is being fed to livestock rather than being consumed directly by humans.

Where will the food for increased numbers of future livestock come from? How many rainforests does it take to preserve every American's right to a Big Mac? This is why the land use question is important.

Mapping has shown a strong relationship between excessive nitrogen in the atmosphere and the location of intensive farm animal production areas. In the United States, the primary greenhouse gases emitted by agricultural activities are methane and nitrous oxide. Globally, the United States is responsible for the greatest emissions of methane from farm animal manure, nearly 1.9 million tonnes. The majority of these emissions emanate from pig and dairy cow manure, from which methane emissions increased by 37% and 50%, respectively, between 1990 and 2005. The U.S. Environmental Protection Agency attributes this increase to the shift toward housing pigs and cows in larger facilities where liquid manure management systems are increasingly used.[9] During the same 15-year period, nitrous oxide emissions rose by 10%, an increase attributed to the poultry industry's shift toward litter-based manure management systems, confinement in high-rise houses, and an overall increase in the number of birds raised and killed for food.

Farm Animal Waste

As animal agriculture industrialized over the last 50 years, more animals have been intensively confined in fewer, but larger, operations. Today, nearly 10 billion land animals are raised for meat, eggs, and milk annually in the United States, typically warehoused by the tens if not hundreds of thousands in industrialized production facilities known as factory farms. The U.S. Department of Agriculture estimates that confined farm animals generate more than 450 million tonnes of manure annually, three times more raw waste than generated by Americans.

Feed

The production of animal feed—mainly high protein and concentrated feeds made from corn and soybeans—requires large amounts of chemical fertilizer. Animal production accounts for a very significant portion of total fertilizer use; more than half of the global corn crop is used for animal feed. Corn uses more nitrogen fertilizer than any other crop, while other feed crops, including barley and sorghum, also use significant amounts. In total, experts estimate that fertilizer used in feed production contributes an estimated annual emission of CO₂ of more than 40 million tonnes.

Energy Use Varies by Type of Production System

Massive, enclosed factory farms (also known as confined animal feeding operations, or CAFOs) use a great deal of energy for lighting, heating, cooling, automated machinery for feeding and watering, and ventilation. In addition, to produce feed for farm animals, the combined fossil fuel for machinery and energy use for herbicide and pesticide production and seed usually exceeds that of fertilizer production. On-farm fossil fuel use may emit as much as 90 million tonnes of carbon dioxide per year alone. Production systems that rely on grasslands or crop residues for feed, on the other hand, usually have very low or even negligible fossil fuel use.

Deforestation

According to the FAO, deforestation for farm animal production is responsible for 2.4 billion tonnes of CO₂ per year. A 2004 Center for International Forestry Research (CIFOR) report stated that the total area of forest lost increased from 41.5 million hectares in 1990 to 58.7 million hectares in 2000. In just ten years, an area twice the size of Portugal was lost, most of it to pasture for farm animal production. In June 2005, the FAO predicted that by 2010, more than 1.2 million hectares of forest in Central America and 18 million hectares in South America will disappear due in large part to clearing land for grazing cattle.

The FAO calls for action on many fronts, recommending a range of measures to mitigate the environmental assault by animal agriculture, including:

- **Land degradation:** Restore damaged land through soil conservation, better management of grazing systems, and protection of sensitive areas.
- **Greenhouse gas emissions:** Improve animal nutrition and manure management to cut methane and nitrogen emissions.
- **Water pollution:** Better manage animal waste in industrial production units, modify diets to improve nutrient absorption, and make better use of processed manure on croplands.
- **Biodiversity loss:** As well as implementing the measures above, improve protection of wild areas, maintain connectivity among protected areas, and integrate farm animal production and producers into landscape management.

The Humane Society of the United States, the nation's largest animal advocacy organization representing 1 in 30 Americans, calls for additional, critical actions each one of us can and must take:

Reduce: Every hour in the United States, more than 1 million land animals are killed for human consumption. If each one of us cuts back on our animal consumption by only 10%, approximately 1 billion animals would be spared a lifetime of suffering each year and the impacts of industrialized animal agriculture would be diminished.

Refine: Not all foods are equal when it comes to animal welfare or their environmental footprint. Each industry has its own abusive practices, and some are much crueler than others. For example, the chicken, egg, and pig industries tend to be far more abusive to animals than the beef industry, and extensive systems, such as free-range, are typically much more environmentally friendly than industrialized factory farms. Refining our diets by avoiding conventional factory-farm products helps diminish animal suffering and protect the environment.

Replace: The consequences of choosing vegetarian options are enormous—not only for farm animals, but for public health and environmental integrity.

Although the GECFTWC model cannot rectify all the issues that face the needed growth in the livestock industry, several new biomass technologies incorporated in the GECFTWC model can and will assist this industry in reducing its carbon and methane emissions.

Furthermore, through GECFTWC research and development collaborative partnerships, GECFTWC will constantly introduce new green and sustainable technologies to assist the Livestock industry.

The GEC Feed The World Coalition implementation strategy is to use current and future green technologies in the fields of Aquaculture, Water, Agriculture and Livestock industries.

GECFTWC has created an ideal and intricate business model that allows for multiple revenue streams from one location.

Revenues can and will be generated from the production of organic fish, organic fruits and vegetables, Algae cultivation and sale, Energy production and sale, fish emulsion sale, feed stock sale, water creation and sale and biomass.

Although each facility created by GECFTWC may not have all the accumulative parts of the business model. All modules are not necessary for fiscal success at each individual location.

The essence of the GECFTWC model is to create the most economical and profitable facility within each community. But the true mission of the GECFTWC is to create a completely sustainable facility.

The plan is to market the fish and fruits and vegetables to the restaurant and hospitality industry as close to each facility as possible thus reducing the facilities carbon foot printing from exporting outside the immediate area. This will also create a robust local economy through the creation of jobs and the integration of products locally.

Another amazing factor in the GECFTWC model is the public/private partnerships that will also be a benefit to the local community. The National Green Energy Council, a nationally recognized non government organization and advocacy group based in Washington, D.C. who is leading the charge for 21st Century Green Technologies is one of the major collaborative partners with GECFTWC.

The GEC will use the construction and build out process of the GECFTWC facilities to utilize the process as on the job training for the local unemployed through the GEC's Green Jobs Corps™ program. Working with the local governments and agencies the Green Jobs Corps™ program will train workers in weatherization and energy efficiency while making GECFTWC facilities as weather tight and energy efficient as possible thus reducing GECFTWC operating costs at all facilities.

Although GEC Feed The World Coalition cannot cure all the ills that face our growing world population, we feel that we can at the least provide the World with a new way of creating food and water in a more sustainable way while creating thousands of new green jobs in the short term and possibly making a more inhabitable Earth in the long term.