

ID 589: Systems Workshop

Fall 2006

MASSIVE CHANGE: Living in a World with Rising Seas



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Massive Change

Strategies for Living in a World with Rising Seas

Charter

Background

Global warming is now recognized as fact almost without question. Arguments to the contrary put forth twenty years ago are no longer credible, and only the most extreme critics still contend that the changes we see are natural, not caused by human activities. The question now is not whether global warming is taking place, but how serious its consequences will be.

Over the twentieth century, the Earth's average global surface temperature increased .6° Celsius (1.08° Fahrenheit). Estimates made in 2004 of the amount of warming we will experience in this century suggested a likely range of 2.4 to 5.4°C (4.3 to 9.7°F), but a more recent paper (2005) by a team of Oxford University scientists suggests a significantly hotter range of possibilities: 2 to 11°C (3.6 to 19.8°F), pushing the most likely value upward.

Darkening the picture further, the greenhouse gases already put into the atmosphere will have effects lasting centuries. The concentration of carbon dioxide and its greenhouse gas equivalents in the atmosphere before land-clearing and industrialization in the 18th century was about 265 parts per million (ppm). It is now nearly 400 ppm. To stabilize concentrations at 450-550 ppm will require major reductions in carbon emissions beginning immediately. And the 450-550 level is not safe; stabilization must be succeeded by reductions in concentration, which will take more than a century at natural rates of absorption. Warming at this magnitude is likely to be greater than any since the large and abrupt Younger Dryas event 11,000 years ago. "Warming as large and rapid as that projected for the twenty-first century might be expected to create severe problems for natural ecosystems and human societies. Indeed, evidence from past climate changes of similar magnitude point to major impacts, which, if humans had been present in numbers like today, would have been disastrous" (Pittock 2005, 21).

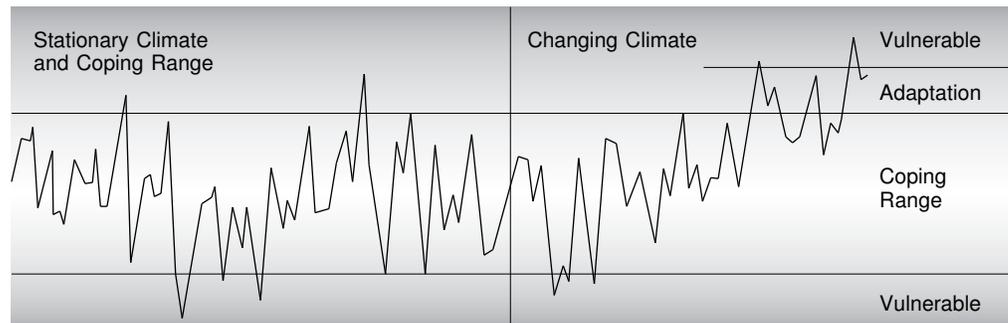


Figure 1. Adaptation buys time by extending the coping range.

(adapted from Pittock 2005, 73)

It is too late to avoid the effects of global warming. But it is *not* too late to assemble and project strategies and tools to allow us to adapt (Figure 1). To be able to deal with the great challenges of emissions reductions that will be necessary on a global scale to mitigate the worst of the greenhouse changes—while improving or even maintaining our quality of life—will require that we rise above the widely diverse environmental challenges that now will confront local

regions and communities. Change will not be uniform. Some regions will be hotter and drier; some will be wetter. Around the world's coastlines, all habitats will experience rising waters (16 of the world's 19 cities rated as megacities in 2005 were on a coast). Weather events will become more intense and more frequent. And a host of induced plagues will follow on from these climatic disruptions. Our passport to survival will be our capacity to adapt.

A. Barrie Pittock. **Climate Change. Turning Up the Heat.** Collingwood, Vic., Australia: CSIRO Publishing, 2005.

Relevant Trends

Trends initiated by emerging technologies, changing environmental conditions, and evolving social change will have real impact on the situation. Among such trends are:

Population Growth

Population growth continues to soar around the world. Particularly in developing countries, but also in countries with significant immigration (such as the United States), rates of population increase are putting heavy demands on available resources. Although estimates for a final asymptote have decreased, world population is still expected to top 9 billion by 2050. It is now 6.64 billion.

Population Movements

A combination of forces is creating a movement of people from rural to urban environments. In the developing countries, it is the perception that better jobs are in the cities. In the developed countries, it is the renaissance of the city as a cultural center coupled with the progression of societies from agriculture to manufacturing to service to information economies. In 2005 for the first time, the world's population was more urban than rural.

Energy Resource Depletion

World petroleum resources are reaching the point where additions to reserves no longer equal reductions from production. Estimates for final peak production vary from 2005 to a just a few years from now. The world economy, deeply committed to petroleum as fuel resource, must meet its energy needs by other means in the near future.

Diminishing Water Resources

Water supplies are already becoming precious resources in many parts of the world. Today, one-third of the world lives in water-stressed countries; by 2050, two-thirds will be in similar circumstances—including significant parts of the U.S. As regions are strained by greater demand, new efficiencies in water distribution, use, purification and reuse will be mandatory.

Increasing expectations

The growing availability and capabilities of communications such as cellular telephones, satellite and cable TV, and the Internet are providing people with daily knowledge of living conditions, problems, products, threats and services everywhere. As the media create new and faster avenues of communication, they also raise levels of awareness and create expectations that both fuel demand and encourage willingness to change.

Internet Penetration

Computer use and Internet access grow exponentially every year. Information of encyclopedic detail can be obtained more and more easily, and complex, sophisticated processes can be used remotely. Access to high-quality communications and

sophisticated computer tools are increasingly available to individuals and groups anywhere. In the United States, Internet penetration reached 67% in 2005, and some Asian and European countries surpass that.

Emerging Technologies

The pace of technological change continues to accelerate, bringing new science to industrial, institutional and governmental uses at an ever quickening pace. Most notable among many promising fields, major technological innovations can be expected in the new disciplines of molecular nanotechnology, robotics and the biosciences.

New Relationships

Greater public mobility and access to information is changing the nature of association for many individuals and organizations. Organizations that once operated in isolation are now players in a common environment. Sometimes the emerging relationships are competitive, sometimes cooperative, and new forms of relationship can be expected to be created as conditions evolve.

Project Statement

Using Structured Planning methodology, conduct an advanced planning project to develop a portfolio of strategies, processes and system concepts that can be custom-tailored to threats of rising seas as they may massively affect a locality or region. The proposal should:

1. treat all concepts as adaptive tools, adaptive to site conditions at implementation, adaptive over time to changing capabilities and conditions.
2. consider the full spectrum of environmental planning from anticipation to preparedness to implementation to restoration.
3. collect and incorporate best practices as they are known to organizations, agencies and planning experts throughout the emerging global warming community.
4. anticipate and plan for networked operational cooperation among affected and spared communities locally, regionally and internationally.
5. seek out and favor concepts that maximize economic, social and/or environmental benefits beyond their primary function to alleviate the effects of global warming.

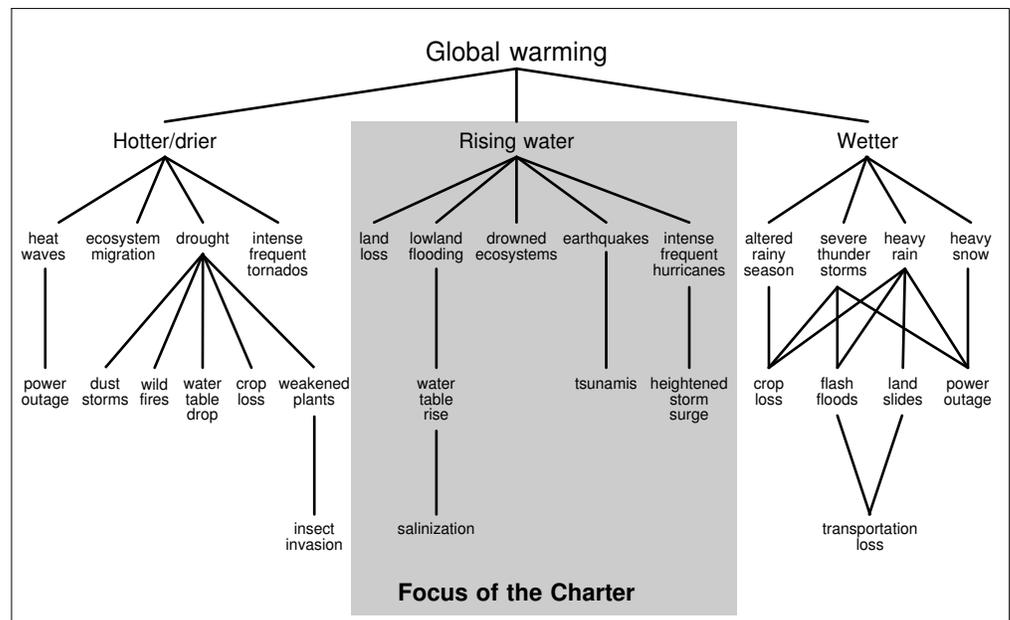


Figure 2. Some of the local/regional events and consequences to be expected.

Goals

As general guidelines the project should:

- Explore a full range of possibilities, paying especial attention to the products of emerging technologies successfully advancing through research and development.
- Include ideas for processes, tools, systems and products—including procedures, services, activities, organizational concepts and any relevant relationships among them.
- Explore revolutionary as well as evolutionary ideas.
- Plan for communication processes by means of which other localities, regions and states can learn of and implement successful procedures.
- Consider potential costs and funding thoughtfully; proposals should not incorporate unnecessary frills, but should not ignore perilous outcomes with low risk simply to avoid costs. Treat costs as you would treat those for catastrophe insurance; err on the cautious side and hedge your bet with ancillary economic benefits.
- Conceive the properties and features of the concepts as means to build trust and cooperation between communities. Some will be lucky; others will not; means for the support of others will need to be core tools for all.

Overall, the solution should:

- Assume that the proposal can be acted upon as it is conceived. Do not under-propose on the assumption that a concept might be politically opposed.
- Demonstrate what might be achieved. The value of the proposal is in its ideas, not its certain attainability. Ideas that might not be fully attainable or feasible today may be achieved tomorrow—if they are known.

Resources

Resources for the project will be:

Physical:

- The facilities of the Institute of Design, including Room 514 as general meeting space at the beginning of each class session, and 3rd and 5th floors for team activities.
- Computing support from the fifth floor computer facilities.
- Equipment as necessary from ID resources.

Financial:

- None

Human:

- Planning Team

Gabriel Biller	Elizabeth Martinez de Morentin
Eric Niu	Kristy Scovel
Natrina Toyong	Albert Wang

- Project Advisors:

Charles L. Owen	Distinguished Professor Emeritus
John Pipino	Adjunct Professor

Schedule

The project will be conducted from August 29 to December 8, 2006.

Week	Phase	Activity	Product
1 Aug 29	Introduction	Introduce project	
Sep 1	Project Definition	Develop Issues & Defining Statements	
2 Sep 5 Sep 8		In-Progress Review	Issues DefStates 1
3 Sep 12		Develop Modes and Activities of Function Structure	
Sep 15		In-Progress Review	DefStates 2 Fn Struc 1
4 Sep 19	Information Development <i>Action Analysis</i>	Generate Functions, Design Factors and Solution Elements	
Sep 22			
5 Sep 26 Sep 29			
6 Oct 3		In-Progress Review	DefStates complete Fn Struc 2 DesFacs 1 SolnEls 1
Oct 6	Information Development <i>Action Analysis 2</i>	Complete Functions, Design Factors and Solution Elements	
7 Oct 10 Oct 13			Fn Struc complete DesFacs complete SolnEls complete
8 Oct 17	Information Structuring <i>Interaction</i>	Score Soln Elements vs Functions	
Oct 20	<i>Structuring</i>		RELATN input

Week	Phase	Activity	Product
9 Oct 24 Oct 27	Concept Development	Means/Ends Analysis	Inf Structure
10 Oct 31 Nov 3		Ends/Means Synthesis	Inf Struc named
11 Nov 7 Nov 10		In-progress Review	Initial System Elements
12 Nov 14		Presentation	Final SysEls
Nov 17	Communication	Refine final SysEls; write report; complete illustrations	
13 Nov 21 Nov 24	Thanksgiving Holiday		
14 Nov 28 Dec 1			
15 Dec 5 Dec 8		Final Presentation	Illustrated Report

Methodology

The project will be conducted using Structured Planning (See articles on the subject by Charles Owen at <http://www.id.iit.edu> under the *Publications* section of *Research & Ideas*:

1. *Context for Creativity*, 1991.
2. *A Critical Role for Design Technology*, 1993.
3. *Design, Advanced Planning and Product Development*, 1998.
4. *Structured Planning*, 2001.

Also, see the book by Charles L. Owen available at the Institute of Design: **Structured Planning. Advanced Planning for Business, Institutions and Government. Notes on the Process with Summary Pages and Examples**, (2006).

Issues

Consider the following topics as initial issues to be investigated. Supplement them with additional issues as information is developed during the first phase of the project.

Technology. What approach should be taken toward the use of emerging technologies and advanced science and engineering concepts?

Adaptivity. How should elements of the system be prepared to respond to evolving environmental threats and emerging technological capabilities?

Networking. What provision should be made toward partnering with other cities, regions, suppliers of funding, technology, goods, etc.?

Time of Introduction. For what time frame should the portfolio's system of tools be planned for implementation?

Means of Introduction. How should the portfolio be introduced to facilitate acceptance and implementation?

Public/Private Sector Relationships . How should the portfolio be positioned with respect to authority/responsibility for implementation and operation?

Concept Communication. How should the idea of the portfolio and its individual strategies, processes and system concepts be brought to public and institutional attention?

Cost. How should expected costs of system elements be approached?

Disaster Contexts. What expectations should be set for extreme conditions to be withstood?

Self-Sufficiency. What level of self-sufficiency should be sought for communities and other political entities?

Defining Statement		Issue Adaptivity	1
Project Massive Change: Living in a World with Rising Seas	Question at Issue How can local resources be leveraged to benefit our solution?		
Originator Eric Niu			
Contributors	Position <input type="checkbox"/> Constraint Local knowledge and experience should help determine the range of adaptable solutions that can be included in the portfolio. <input checked="" type="checkbox"/> Objective <input type="checkbox"/> Directive		
Sources Blanco, Ana V. Rojas. 2006. Local Initiatives and Adaptation to Climate Change. <i>Disasters</i> 30(1) 140-147.	Alternative Position <input type="checkbox"/> Constraint A global organization should determine which solutions will be applied across each region <input checked="" type="checkbox"/> Objective <input type="checkbox"/> Directive <input type="checkbox"/> Constraint <input type="checkbox"/> Objective <input type="checkbox"/> Directive		

Background and Arguments

Scientists often dismiss local knowledge and experiences when trying to understand the larger trends of extreme climatic events. While this might be understandable to a certain degree, it ignores the potential insights applicable to adaptation that these sources can provide. The local support system is ultimately most responsible for helping communities prepare for events and cope with their aftermath. By tapping these resources for information, we can discover inventive local adaptations that might be applicable in other similar situations.

With the advice of global scientific knowledge, local governing bodies should be given the freedom to determine the appropriate measures to be taken for their constituents. This helps to ensure that the needs of the local population are met and provides 'buy-in' through participation.

Defining Statement

Issue
Adaptivity

2

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

How should elements of the system be prepared to respond to emerging technological capabilities?

Contributors

Position

- Constraint Technological solutions must allow for seamless integration of emerging technologies.
- Objective
- Directive

Sources

Team Deliberations

Alternative Position

- Constraint Solutions should be developed around standardized formats to streamline the implementation of new tools.
- Objective
- Directive

- Constraint
- Objective
- Directive

Background and Arguments

All too often, proprietary technology is designed as an optimal solution for a specific problem at a specific point in time. While such a solution might cost less and work more efficiently, it is ultimately not robust enough to adapt to changing situations.

For example, current laptops are typically designed with very limited options to upgrade. Often, there are only two features that the typical user can upgrade. Once the advantages that can be gained from upgrading these features have been exhausted, the user in need is left with no option other than to purchase an entirely new computer.

Counter to this, camera lenses are generally designed in a standard format robust enough to meet future needs. Camera companies plan that users who purchase future products will want to be able to seamlessly use previous products they invested considerable money in. A lens purchased 20 years ago may not function as smoothly as one introduced today, but was designed well enough to account for any improvements in technology so that a camera body purchased today can still interface with it.

Defining Statement

Issue
Adaptivity

3

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

How should elements of the system be prepared to respond to evolving environmental threats?

Contributors

Position

- Constraint
- Objective
- Directive

Solutions presented must be resilient enough to withstand increasingly acute environmental threats.

Sources

Team Deliberations

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

Solutions ought to take advantage of the energy released by acute environmental threats.

Background and Arguments

It has become apparent that acute climatic events cannot be prevented. Current trends in weather patterns show a consistent increase in magnitude, and it is likely to get worse. Many of factors determined to affect changing weather patterns are affected by deteriorating situations caught in a positive feedback loop. Once set in motion, the consequences of these systems will not be felt for many years to come.

As these changes can no longer be stopped, society must be able to adapt to these inevitable conditions. Any solutions must be designed to withstand these increasingly hostile conditions.

Future climatic events are expected to be stronger than currently observed, yet the nature of such events is expected to remain similar to what we experience today. We should be able to confidently predict what types of events to prepare for. Our concern therefore will be to decide what magnitude of event we should anticipate defending against while maintaining a reasonable level of cost.

In addition, with the tremendous amount of energy motivating acute climatic events, discovering methods of harnessing and capturing that energy would benefit the resilience of our society.

Defining Statement

Issue
Adaptivity

4

Project

Massive Change:
Living in a World with Rising Seas

Originator

Albert Wang

Question at Issue

How should elements of the system be prepared to respond to evolving environmental threats and emerging technological capabilities?

Contributors

Position

- Constraint System elements must be categorized appropriately to set precisely flexibility for dealing with unpredictable environmental threats and diversely emerging technological capabilities in the future.
- Objective
- Directive

Sources

Alexander, David. *Principles of Emergency Planning and Management*.
Haubelt, Christian, Jürgen Teich, Kai Richter, and Rolf Ernst. "System Design for Flexibility." 2002. <http://citeseer.ist.psu.edu/cache/papers/cs/26788/http:zSzzSzwww.ida.ing.tu-bs.dezSzresearchzSzpublicationszSzpszSzC.02:SysteDesigFlexi.pdf/haubelt02system.pdf>

Alternative Position

- Constraint System should only focus of the disaster context which directly caused by rising sea and understand the cause, effect and how to response and avoid.
- Objective
- Directive

- Constraint System should plan certain individual element for evaluating and adjust specific system elements' function to meet the changes of environment threats and emerging technology.
- Objective
- Directive

Background and Arguments

The flexibility of system elements for being prepared to respond to evolving environmental threats and emerging technological capabilities are decided by three different aspects: system element design, system efficacy evaluation and system testing. Designing a system to best meet a set of requirements on cost, efficiency for a given, single application is challenging, but has been formalized already by means of graph-based allocation and binding problems. In areas such as platform-based design, however, a system should be dimensioned such that it is able to implement not only one particular application optimally, but instead a complete set of different applications or variants of a certain application. Hence, the question here becomes to find a trade-off between the flexibility of the architecture that is able to implement several alternative behaviors and its cost. Another scenario where flexibility is necessary is in systems that may react to changes of the environment during execution (adaptive systems). There also, it is necessary or desired to implement different behaviors with the price of additional cost not interfere with the already running functionality.

Defining Statement

Issue
Concept Communication

5

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

How should the idea of the portfolio and its individual strategies, processes and system concepts be brought to public and institutional attention?

Contributors

15 Sept 2006 Gabriel Biller

Position

- Constraint
 - Objective
 - Directive
- Concepts and their meaning **should** mainly be communicated in a concise, understandable format that resonates with the general public, and they should be transmitted via multiple media, particularly taking advantage of relevant trends in communication via Internet and mobile phone messaging.

Sources

Dutch Ministry of Transport, Public Works and Water Management. **A Different Approach to Water, Water Management in the 21st Century.** Ghent, Belgium: Snoeck – Ducaju & Zoon, 2000.

Lynas, Mark. **High Tide: The Truth About Our Climate Crisis.** New York: Picador, 2004.

Alternative Position

- Constraint
 - Objective
 - Directive
- The message and information presented by the scientific community **must not** be reinterpreted by personal or political bias.
- Constraint
 - Objective
 - Directive
- Detailed information **should** be made available for those with the interest and knowledgeability to comprehend it.

Background and Arguments

Despite the vast amounts of knowledge available to us today, it is frequently communicated in formats and languages unfamiliar to a general audience. Raw technical information cannot readily convey the magnitude of its information to a layperson.

The most impactful messages are those that the audience can feel a personal connection to. Without a personal resonance, humans are more likely than not to dismiss information presented to them.

For example, in a typical day the temperature on average varies about 15 degrees Fahrenheit. To the average person, this is a bearable range of variance. This is what personal experience tells us. Yet catastrophic climatic events have been caused by changes in global average temperature of some 6 degrees Celsius. Where the major differentiator between these two figures is local temperature versus average global temperature, this format of information is ineffective at conveying the magnitude of its relevance to the public on a personal level.

Though the United States collects and processes more information than any other nation, the rhetoric presented to the general public is colored by political opinion. In fact, when the Administration tried to alter a report generated by its

own Environmental Protection Agency, the Agency elected to remove the passages on climate affects altogether.

In addition, while pamphlets have been distributed in places like Germany and the Netherlands to inform the public of the dangers of global warming, the concepts of the system concepts may need to be transmitted via other media in locations where literacy rates may be lower than in Western European nations. Furthermore, efforts should be made to leverage all type of communication media for concept communication, particularly with the increasing penetration of Internet and with the pervasiveness of mobile phones in some third world countries where other infrastructure may be more lacking.

Any adaptive features of the portfolio will, by definition, require the general public to become accustomed to. It will be critical to maintain clear and understandable communication about these changes in lifestyle to the general public so that they can adapt to living in a new world. It should be made clear that there are dangers in living near sea level, however, the tools and elements of the portfolio should be introduced and explained so that the public understands and is confident in leadership without getting panicked.

Defining Statement

Issue
Concept Communication

6

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

How should the problem and its urgency be brought to public and institutional attention?

Contributors

Position

- Constraint Concepts and their meaning must be communicated using concise, understandable methods that resonate with the general public
- Objective
- Directive

Sources

Tufte, Edward R. *Envisioning Information*.
Cheshire, Connecticut: Graphics Press LLC,
1990.

Revkin, Andrew C. and Seelye, Katharine Q.
*Report by E.P.A. Leaves Out Data On Climate
Change*. The New York Times, June 19, 2003.

Lynas, Mark. *High Tide: The Truth About Our
Climate Crisis*. New York: Picador, 2004.

Alternative Position

- Constraint Communications should be filtered by government regulatory agencies to ensure unified message delivery.
- Objective
- Directive
- Constraint
- Objective
- Directive

Background and Arguments

Despite the vast amounts of knowledge available to us today, it is frequently communicated in formats and languages unfamiliar to a general audience. Raw technical information cannot readily convey the magnitude of its information to a layperson. The most impactful messages are those that the audience can feel a personal connection to. Without a personal resonance, humans are more likely than not to dismiss information presented to them.

For example, in a typical day the temperature on average varies about 15 degrees Fahrenheit. To the average person, this is a bearable range of variance. This is what personal experience tells us. Yet catastrophic climatic events have been caused by changes in global average temperature of some 6 degrees Fahrenheit. Where the major differentiator between these two figures is local temperature versus average global temperature, this format of information is ineffective at conveying the magnitude of its relevance to the public on a personal level.

In a sense, this relates to the concept of visual design for macro- and micro-readings. Information can be conveyed on a macro level to illustrate trends or create a powerful impact. Dense amounts of complex information is then simplified by the audience and personalized to a micro level that the reader can empathize with.

Though the United States collects and processes more information than any other nation, it is ironic that the rhetoric presented to the general public is colored by political opinion. In fact, when the Administration tried to alter a report generated by its own Environmental Protection Agency, the Agency elected to remove the passages on climate affects altogether.

Instead, concepts and recommendations must be communicated in a method that resonates with the audience on a personal level. By providing the general public with scenarios they can relate to, creating buy-in, they are more likely to aid, rather than hinder, implementation. Technical specifics and scientific knowledge should remain among those who can understand and implement them.

Defining Statement

Issue
Cost

7

Project

Massive Change:
Living in a World with Rising Seas

Originator

Gabriel Biller

Contributors

Question at Issue

How should expected costs of system elements be approached?

Position

- Constraint
- Objective
- Directive

Costs of system elements **must** be considered as total costs (direct costs, indirect costs, and lost opportunity costs) of a long-term strategy that is mindful of future climatic developments.

Sources

Brown, Lester. **Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble**. New York: WW Norton & Co, 2006.

Dutch Ministry of Transport, Public Works and Water Management. **A Different Approach to Water, Water Management in the 21st Century**. Ghent, Belgium: Snoeck – Ducaju & Zoon, 2000.

Intergovernmental Panel on Climate Change, Response Strategies Working Group. **Strategies for Adaptation to Sea Level Rise**. The Hague, 1990.

Kolbert, Elizabeth. **Field Notes from a Catastrophe: Man, Nature, and Climate Change**. New York: Bloomsbury, 2006.

Alternative Position

- Constraint
- Objective
- Directive

Only the direct costs of system elements **should** be considered, since future conditions and projects cannot be anticipated with certainty.

Background and Arguments

According to the IPCC, there are three adaptation options available for coastal areas to adapt to the all but certain acceleration in sea level rise due to global climate change: 1) retreat, 2) accommodation, and 3) protection.

Retreat is a strategy of simply abandoning coastal areas and letting the seas reclaim them. Accommodation implies staying on the land and making little or no effort to prevent flooding. Protection involves protecting the land so that it may maintain its current use.

In New Orleans, protection was the strategy, though it is becoming increasingly evident that it was not adopted wholeheartedly. It is difficult to put an estimate on the total cost of Hurricane Katrina, but a survey of the scores of estimates already made definitely put it between \$100 billion and \$200 billion over the next five years. For the roughly 500,000 citizens of New Orleans, this comes out to \$200,000 to \$400,000 per person.

Imagine the potential devastation, then, were another storm to strike elsewhere, say further north on the Atlantic coastline. The threat of stronger storms due to warmer seas due to global warming, coupled with the threat of rising sea levels and higher storm surges would put many highly populated areas on the East Coast of the United States at great risk, for example. What if 10,000,000 citizens in the New York/New Jersey area are displaced by a catastrophe? What would be the cost of such a disaster? At \$200,000 to \$400,000 per person, we

would be talking about a potential total cost of around \$2 trillion to \$4 trillion, or approximately 1/6 to 1/3 of the U.S. GDP.

In fact, as sea levels are rising, there is imminent danger to many low-lying island nations in the South Pacific and other megacities like London and Shanghai. There are tens of millions of Bangladeshis that would be displaced by a 1-meter rise in sea level, which could happen in little more than a century according to current estimates. Half of Bangladesh's riceland would be flooded, devastating food supply.

The Dutch are the world leaders in water management systems. One third of the Netherlands is below sea level, and they have on many occasions in history learned the bitter lessons of not adapting to their situation. Shortly after a devastating flood in 1953, they began the \$5.5 billion Delta Works project, finally completed in 1997, which was made possible because of the will of the nation and a collective prioritization for protection and prevention of another catastrophe.

The Netherlands is a small country of 8 million people, but they have made it a national priority to think about water management as a long term and constantly worsening problem, so they know that the Delta Works is not the end of the story. They know that as sea levels rise more, they will have to protect themselves further. And they are far too painfully aware of the massive cost of failing to do anything.

Defining Statement

Issue
Cost

8

Project

Massive Change:
Living in a World with Rising Seas

Originator

Gabriel Biller

Question at Issue

Should the solution portfolio be ultimately economically sustainable or profitable?

Contributors

Position

- Constraint
- Objective
- Directive

Profitability **should** not be a determining criteria for the solution portfolio, as its primary purpose is to provide a social good.

Sources

Linard, Laura. 2 Sept 2002. *The Role of Government When All Else Fails: Q&A with David Moss*. Harvard Business School Working Knowledge for Business Leaders. <http://hbswk.hbs.edu/item/3080.html> (accessed 15 Sept 2006).

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

The solution portfolio **must** not be prohibitively costly such that no government or society could possibly implement it in a sustainable manner.

The solution portfolio **ought** to stimulate innovation and growth in new or existing business sectors, which might eventually lead to profitability.

Background and Arguments

It is probably nearly universally agreed that among the many functions and roles of a government, the protection of its people and defense of itself as a nation are paramount.

The threat of environmental catastrophes, mass displacements of people, devastation to ecosystems, contamination of water supply, loss of life and property, destruction of agriculture and industry, and the reverberating effects that these crises would have on a people and an economy surely would concern a government. And all these crises could and would result from the threat of storm surges and flooding of coastal areas that now threaten so many parts of the world.

In Laura Linard's interview with David Moss of Harvard Business School, Professor Moss states that one of the essential functions of government is to manage risk, in both the private sector and the public sector. As he says, "Public risk management itself has obviously evolved and expanded quite considerably over time, such that now—at the dawn of the twenty-first century—it is hard to conceive of any more important or pervasive governmental function."

The risk of coastal areas threatened by rising sea levels is very real and potentially devastating to a nation. Government may not have the only role in managing this risk, but will certainly play an important, if not the most important, role.

Furthermore, government, by definition is not in the business of creating wealth, and it has an obligation to abide by the social contract. In other words, however the solution portfolio may be implemented, its purpose is to protect the welfare of the people and address their collective needs, not to generate profit.

Defining Statement

Issue
Disaster Context

9

Project

Massive Change:
Living in a World with Rising Seas

Originator

Albert Wang

Contributors

Eric Niu

Sources

Stephenson, R.S. "Disaster Assessment," 2nd Edition, United Nations reorganization and the Disaster Management Training Program. der Heide, Dr. Auf. "Disaster Response: Principle of preparation and coordination." <http://orgmail2.coe-dmha.org/dr/DisasterResponse.nsf/section/09?opendocument&home=html> "Emergency Management Accreditation Program." <http://www.emaponline.org/>

Question at Issue

How should the portfolio define the range of disaster context caused by rising sea which the system should cover?

Position

- Constraint All extended disaster form rising sea must be survey carefully and understand the cause, effect ,how to response and avoid.
- Objective
- Directive

Alternative Position

- Constraint System should only focus of the disaster context which directly caused by rising sea and understand the cause, effect and how to response and avoid.
- Objective
- Directive
- Constraint
- Objective
- Directive

Background and Arguments

Cause. The disaster cause by global warming have various types and scales. Rising sea is one of the major future scenario which will cause huge impact on nature environment, human society and ecosystem. In general speaking, because of global warming, the rising temperature melt down the ice cap of pole area, more water flow into ocean cause the sea level rising another source of water is from land that the water contain is reducing because of wet land development, losing rain forest and agriculture overload, but the effect of reducing contain water is not obvious. However, according to the IPCC global warming report, at the end of this century sea level will rise up to 6 meters.

Effect. In the long term scale, the rising sea level will submerge coastal area include many mega city such as New York, Shanghai, and many land which have high agriculture value. There for more, some low altitude tropical islands will be totally under water after the sea rise. The result will include global scale of food and clean water shortage, collapse of local economy, million of refugee and resource conflict even war. In the short term scale, high ever sea level will foster more and bigger Hurricane, bigger Tsunami and more extreme climate changes. The result, just like we witness today in Hurricane Katrina or mega flood in the south China, Thousands of people lose their life, Millions people lose there home and huge impact to local society also influent in National and global scale.

Response. In any solution plan for environmental aftermath, disaster assessment play an important role in the planning process, system builder must base on the disaster assessment to evaluate the outcomes of strategy or structure function. Disaster assessment is the process of determining:

- The impact which a disaster has had on a society.
- The needs and priorities for immediate emergency
- Measures to save and sustain the lives of survivors.
- The resources available.
- The possibilities for facilitating and expediting longer term recovery and development.

Assessment is a crucial management task which contributes directly to effective decision-making, planning and control of the organized response. Assessment of needs and resources is required in all types of disasters, whatever the cause and whatever the speed of onset. Assessment will be needed during all the identifiable phases of a disaster, ,from the start of emergency life-saving, through the period of stabilization and rehabilitation and into the long-term recovery, reconstruction and return to normalcy. The focus of assessment and the strategies for data collection and interpretation will need to change as the response evolves.

Defining Statement

Issue Fundamentals

10

Project

Massive Change:
Living in a World with Rising Seas

Originator

Natrina Toyong

Question at Issue

What part of the science should we base our research on?

Contributors

Position

- Constraint The research must be based on scientific data from multiple accredited sources that are well acknowledged by the national scientific society.
- Objective
- Directive

Sources

Pittock, A. Barrie, *Climate Change Turning Up The Heat*. Australia: CSIRO Publishing, 2005

Climate Change 2001: The Scientific Basis,
http://www.grida.no/climate/ipcc_tar/wg1/pdf/WG1_TAR-FRONT.PDF

Alternative Position

- Constraint The research should be based on data and figures that are able to produce alarming and believable scenario of damages and impacts.
- Objective
- Directive
- Constraint The research should be based on the compilation of all researches that are being done today from all over the world.
- Objective
- Directive

Background and Arguments

There are voices from all corner of the world expressing the existence of climate changes today. It is hard enough to convince all parties that should be acting towards the containment of the climate change problem or adaptation to the change, to start taking climate change seriously, it is even harder to make these parties to start investing time, effort and money into it.

The key issue here is that the truth about the climate change will need to be approached as science, with science to back up all solutions for adaptation. True researched areas should be accredited by major scientific communities. This is not really an impossible step to take since most credible reports and key scientific figures are slowly acknowledging the climate change. The task now is to gather all these researches to produce patterns where different reports are able to back up one another.

The early IPCC report in 1966 and its later revision in 2001 is a great source where it has opened a strong case for the argument on the existence of climate change phenomenon. The revision has become the standard scientific reference for many of those involved in the climate change efforts today.

The Intergovernmental Panel on Climate Change (IPCC) was jointly established by the World Meteorological Organization

(WMO) and the United Nations Environment Programme (UNEP) in 1988.

The reports has become a point of references for available scientific and socioeconomic information on climate change and its impacts and on the options for mitigating climate change and adapting to it at the same time provide, upon request, scientific/technical/socioeconomic advice to the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). Since 1990, the IPCC has produced a series of Assessment Reports, Special Reports, Technical Papers, methodologies and other products that have become standard works of reference, widely used by policymakers, scientists and other experts.

Today, there still exists numerous independent research group which although may have invested enough man hours to produce sound enough researches, they have only been misinterpreted as a deliberately causing a moments sensation and stir, thus not getting the seriousness it meant to project. When messages have been misrepresented, it is fairly hard to undo the damage. These are the type of proof and representation of the issue that is best avoided.

Defining Statement

Issue
Human Factors

11

Project

Massive Change:
Living in a World with Rising Seas

Originator

Kristy Scovel

Question at Issue

How should the portfolio of tools account for the emotional and psychological issues of relocation?

Contributors

Eric Niu, Gabriel Biller, Albert Wang, Natrina Toyong, Elisabeth Martinez De Morentin

Position

- Constraint
- Objective
- Directive

Individual and group support should be provided to those who request it before, during and after relocation experienced as result of rising seas.

Sources

EOS - The Life-Work Resource Center
Balkans Aftermath: The post-war transition - denial, crisis & world peace
<http://www.eoslifework.co.uk/balkaft.htm>

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

Community programs should be utilized to defuse the psychological and cultural effects of relocation.

Every person undergoing relocation must receive counseling prior to relocating.

Background and Arguments

During the first shock of trauma adrenaline enables individuals to cope with immediate survival tasks. This stimulates physical and mental responses to immediate situations, accelerates learning and numbs normal emotions. Adrenaline is exciting and sharpens reactions for fit, trained people but causes confusion and panic for others.

After initial shock or excitement individuals make a provisional adjustment to the new situation. They cope with immediate tasks, often very resourcefully. This gives the illusion of having adjusted to the change. But in this second stage of transition the mind suppresses the deeper implications of the trauma or change for several months in optimism or denial. In war this reinforces group identity and patriotism.

During the second three months of a transition individuals begin to experience doubts and inner contradictions. Some deeply held beliefs or basic assumptions about oneself or the world have been violated by events. These conflicts become evident in growing confusion, disillusionment, stress and loss of perspective. Issues will differ between people and countries but the psychological effects will be similar.

Individual anxiety and depression also affects interpersonal relationships - increasing stress and tension in families and communities. Family members may also have been

traumatised by concern for relatives involved in the war and be working through their own transition. Morale deteriorates in communities and organizations and conflicts may increase. People appear to be unreasonable to others because the reasons for their distress are not obvious - even to themselves.

Eventually these inner conflicts are likely to surface in a personal transition crisis. This 'dark night of the soul' typically occurs 5-6 months after the trauma or change began. In this crisis phase people may become deeply distressed. Some may quit jobs, relationships or life itself. Others may be aggressive. This has major implications for mental health, family life and paramilitary action in the Balkans.

Those people who can face and resolve their inner conflicts, e.g. between old loyalties and personal integrity, can break out of crisis into the recovery phase within a few weeks. This may happen in defining moments (10) where individuals make bold decisions to change their life or beliefs. Groups in recovery tackle problems more creatively with greater cooperation and experience a major boost in morale.

Defining Statement

Issue
Means of Introduction

12

Project

Massive Change:
Living in a World with Rising Seas

Originator

Natrina Toyong

Question at Issue

How should politic play its role in a worldwide effort of fighting Global Warming?

Contributors

Position

- Constraint The political role must remain a powerful force in initiating change along with the support of private and non-governmental associations.
- Objective
- Directive

Sources

United Nations Framework Convention on Climate Change (UNFCCC), The Kyoto Protocol, March 15, 1999

Black, Richard. *Solve Climate 'Whatever it costs'* <http://news.bbc.co.uk/2/hi/science/nature/5325714.stm>, last updated: Friday, 8 September 2006, 02:10 GMT 03:10 UK

Alternative Position

- Constraint The system should make participatory of non-political affiliated individuals visibly rewarding.
- Objective
- Directive
- Constraint The system should generate interest at all level without the attraction of political gains as an incentive.
- Objective
- Directive

Background and Arguments

The worldwide fight against global warming is complicated as it is without having any political storm surrounding its workings. It is well accepted that diplomacy and consensus can bring about positive and global scale changes in the fight against Global Warming. A good example would be the UN Climate Change Convention and the Kyoto Protocol. However recent development have shown signs that political governmental involvement may also become the one delaying factor that is slowing these processes down.

The common progression is for governments to negotiate climate agreements through the United Nations. Following this will be a series of progression to follow through. Taking the case of the Kyoto Protocol, Currently, the 37 parties (countries) involved who has pledged commitment to it is drawing up individual initial reports to be submitted by due date, 28th May 2007.

These are positive progression by governments which by good fortune is not influenced by political propaganda. It was not by chance though that all parties involved were countries. However, with a new system, the real driving factor need not necessarily be governments.

There is a lot of good in passing over the decision making into hands of non-political affiliated parties. However, areas of concern would be funding and channels for communication. These non-political collective efforts, given proper access to financial resource and anti-fraudulent guidelines, can become key players in changing all world decisions in Global Warming issues. The design thus should be developed with precision so that the end does not justify the means in which the system should at all level be ethical in nature. The motivation that will be the driving force to encourage participation of private entities would require a visible value in an economic sense. This is the only way any proactive participation can be achieved.

Defining Statement

Issue
Measurement

13

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

How should the solution approach evaluation of its impact/effectiveness?

Contributors

Position

- Constraint
- Objective
- Directive

The solution should evaluate its effectiveness in terms of the successful preservation of human, plant and animal communities.

Sources

Flannery, Tim. *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth*. New York: Atlantic Monthly Press, 2005.

Clements, Paul. 2005. Monitoring and Evaluation for Cost-Effectiveness in Development Management. *Journal of MultiDisciplinary Evaluation* 2: 11-38.

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

The solution must evaluate its overall effectiveness using clear, established metrics such as cost-benefit analyses.

Background and Arguments

Proper measurement is a difficult, complicated goal. The successfulness of such crusades as the 'War on Drugs' and the 'War on Terror' are nearly impossible to quantify. Adapting to the issues related to rising seas will likely involve development projects, some of which will be executed in developing countries. Unlike typical for-profit metrics, such programs are naturally ambiguous and difficult to directly evaluate.

There are currently no generally accepted methodologies for evaluating the impact of the proposed solutions. Due to the unique nature of each adapting locale, it will be difficult to evaluate the effectiveness of the portfolio in a consistent, reliable manner.

Events already set in motion will inevitably lead to the inundation of many small island nations and coastal urban centers. Millions of people live in areas that will be directly affected by rising sea levels. While the economic costs of losing these places to the sea will be tremendous, the most important metric must incorporate the lives of the people and their culture.

The pending extinction of thousands of species should also be addressed. Facing imminent rises in temperature and changes in ocean salinity, many have no place left to migrate to. These

changes affect both plant and animal life. While it is impossible to quantify the value lost to disappearing ecosystems, it is clear that their loss will diminish both the richness of our world and our survival in the global context.

As many changes resulting from global warming cannot be stopped, our goal is to enable those lives that can be saved to adapt to the results of climate change. While evaluation will be difficult to achieve and nearly impossible to quantify, successful implementations will be those that maximize the preservation of human, plant and animal communities.

Defining Statement

Issue
Networking

14

Project

Massive Change:
Living in a World with Rising Seas

Originator

Elisabeth Martinez De Morentin

Contributors

Sources

Gore, Albert. *An Inconvenient Truth*.

Lynas, Mark. *High Tide*.

United Nations Framework Convention on
Climate Change, 2006

stopglobalwarming.org

Question at Issue

How are varying levels of commitment from countries of varying influence/
power/etc. to be determined?

Position

- Constraint Levels of commitment from countries must be determinate through emerging techniques of soft power.
- Objective Politics and diplomacy have to work.
- Directive

Alternative Position

- Constraint Decisions should be taking as a global public good, avoiding governmental/power interest across sectorial and cultural boundaries
- Objective
- Directive

- Constraint
- Objective
- Directive

Background and Arguments

This poses a challenge. Governments have traditionally invested in instruments of hard power as a backstop against the consequences of political and diplomatic failure.

But there is no hard power option either for mitigating climate change or for dealing with its direct impacts. You cannot use military force to make everyone else on the planet reduce their carbon emissions. No weapon system can halt the advance of a hurricane bearing down on a city, or stem the rising sea, or stop the glaciers melting.

If we want to achieve climate security, governments will need to invest more resources in the emerging techniques of soft power. There is no backstop: the politics and diplomacy have to work.

Governments will need, as a matter of security, to build the avenues of trust and opportunity that will divert investment from high carbon to low carbon infrastructure.

They will need to negotiate the agreements that will enable us to do that cost-effectively and without divisive market distortions. They will need to design and mobilize coalitions of mutual interest across sectorial and cultural boundaries to transform the way we supply and consume energy, achieve mobility, and use land.

The technologies to avoid an even more unstable climate are already available. Deploying them rapidly is well within what we can afford. What is needed is an investment internationally of political imagination backed up by public resources on the scale that publics routinely expect for the more traditional aspects of national security.

Defining Statement

Issue
Networking

15

Project

Massive Change:
Living in a World with Rising Seas

Originator

Kristy Scovel

Question at Issue

How should the collaboration of suppliers, organizations, volunteers and policy makers be addressed?

Contributors

Position

- Constraint
 - Objective
 - Directive
- An international non-profit organization should be created. It's efforts should be focused exclusively on this directive.

Sources

Environmental Protection Agency
<http://yosemite.epa.gov/oar/globalwarming.nsf/content/Actions.html>

Alternative Position

- Constraint
 - Objective
 - Directive
- This initiative must be orchestrated by a global association of governments.
- Constraint
 - Objective
 - Directive
- A corporation should be formed to facilitate the collaboration.

Background and Arguments

Today, action is occurring at every level to reduce, avoid, and better understand the risks associated with climate change. Many cities and states across the country have prepared greenhouse gas inventories; and many are actively pursuing programs and policies that will result in greenhouse gas emission reductions.

At the national level, the U.S. Global Change Research Program coordinates the world's most extensive research effort on climate change. In addition, the EPA and other federal agencies are actively engaging the private sector, states, and localities in partnerships based on a win-win philosophy and aimed at addressing the challenge of global warming while, at the same time, strengthening the economy. For more information, see the US Climate Action Report (U.S. Department of State, May 2002).

At the global level, countries around the world have expressed a firm commitment to strengthening international responses to the risks of climate change. The U.S. is working to strengthen international action and broaden participation under the auspices of the United Nations Framework Convention on Climate Change

Defining Statement

Issue
Networking

16

Project

Massive Change:
Living in a World with Rising Seas

Originator

Elisabeth Martinez De Morentin

Question at Issue

What approaches should be taken to solicit support and involvement from local communities?

Contributors

Position

- Constraint Communities must be provide information, support and financial assistance to help each other to make sustainable improvements in their new live clime adaptation.
- Objective
- Directive

Sources

Gore, Albert. *An Inconvenient Truth*.

Lynas, Mark. *High Tide*.

United Nations Framework Convention on Climate Change, 2006

stopglobalwarming.org

Alternative Position

- Constraint Governments and NGOs should moderate and provide education in order to implement a successfully solution.
- Objective
- Directive
- Constraint
- Objective
- Directive

Background and Arguments

Geographical, cultural and socioeconomic diversity means communities need different solutions to meet individual community conditions and needs.

Communities have to develop uniquely tailored plans and are employing novel ideas and approaches to encourage enthusiasm, support and action within their community.

Important principles that will help ensure that Communities will effectively taken to solicit support and reduce greenhouse gases emissions.

Community Development Approach: Most successful community projects are built on real ownership and involvement at the community level. Empower people by involving them at every step in the process and take account of their issues and concerns.

Use of Behavioral Change Approach: Changing the way we use energy requires changes in our behavior. This can only be achieved if people choose to change themselves. Ask people what they think, and what they want to do and change.

Spread the Word: And most importantly, tell others about the amazing success (and maybe occasional failure) your

community has. Sharing ideas and experience is how we all learn - and will be an essential element in addressing climate change.

By using effective community engagement methods and tools, individuals and households will be convinced to join your program and reduce their greenhouse emissions. These tools include:

- Talking to people;
- Giving out information;
- Persuading people;
- Building their motivation;
- Giving feedback; and
- Planning your approach.

Different tools, methods and strategies are more appropriate for some individuals and communities than others. Tools are only effective if they suit the circumstances and people using them.

Defining Statement

Issue
Portfolio Viewers

17

Project

Massive Change:
Living in a World with Rising Seas

Originator

Natrina Toyong

Question at Issue

Who should be the target viewers for the portfolio?

Contributors

Position

- Constraint The portfolio must be specifically designed to be recommended to nation leaders, world organization or any funding institute that can be key player in making a change.
- Objective
- Directive

Sources

U.S. Environmental Protection Agency,
Global Warming - Resource Centre, *Partnership Programs*, <http://www.epa.gov/epahome/partnerships.htm>, Last updated on Tuesday, October 10th, 2006

Alternative Position

- Constraint The portfolio should be designed to be viewed by large funding institute, both private or governmental.
 - Objective
 - Directive
-
- Constraint The system should generate interest at all level of a country, to gain stronger support in all environment effort issues.
 - Objective
 - Directive

Background and Arguments

The key viewers of the portfolio should be individual or organizations that are influential enough to create a change. Influence in this matter are parties involved in decision and law making or is financially-able. These two different target viewers have one thing in-common, they are capable of providing funding solutions. This is very important as the one discouraging factor to any major implementation relating to environmental issue will most likely to incur cost.

The Environmental Protection Agency of United States have presented a list of funding sources. The list is as follows: EPA funding, other federal agencies, states and private foundations. This list is strongly suggests that suitable candidates for funding are as mentioned, influential and able to generate fund.

There is no denying that the entity that makes up the target viewers are individual people. But these individuals make up people who make judgement and decisions collectively, thus giving them the advantage of materializing the visions that has been set. A crucial key to making things happen.

Individual will be able to help when everyone is in the same fight and using the same sets of tools collectively. This can be done at a community, national and even regional level. The key mover here are influential entities. Therefore, the best result

will come if the viewers of the portfolios consists mainly of decision or policy makers and large for profit and non for profit organizations, capable of leading and directing people to initiate visible changes.

Defining Statement

Issue
Public/Private Sector Relationships

18

Project

Massive Change:
Living in a World with Rising Seas

Originator

Elisabeth Martinez De Morentin

Question at Issue

How Should the portfolio be positioned with respect to authority/ responsibility for implementation and operation?

Contributors

Position

- Constraint Because Global Warming is an international issue with no physical borders, the portfolio must support on basis of implementation and operation to a global associations institutions.
- Objective
- Directive

Sources

Gore, Albert. *An Inconvenient Truth*.

United Nations Framework Convention on Climate Change, 2006

Alternative Position

- Constraint
- Objective The system should conduct a clear and universal cultural and path to link different sectors; private/public countries; Industrialized, developing, least developed.
- Directive
- Constraint
- Objective
- Directive

Background and Arguments

Global warming is a real fact, from now on the earth population is going to need to confronted and adapted to that change base on our existing social system.

The product it is focus on countries globally cooperating in preparing for adaptation to climate develop and elaborate appropriate and integrated plans for International Ethnography support.

Addressing international relevant social economic, environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy.

Project

Massive Change:
Living in a World with Rising Seas

Originator

Kristy Scovel

Contributors

Sources

Third World Network
<http://www.twinside.org.sg/title/twr116g.htm>

Question at Issue

What level of autonomy should be sought for nations that are required to relocate into alternate countries?

Position

- Constraint Refugee nations should retain fiscal autonomy after relocation into a host nation.
- Objective
- Directive

Alternative Position

- Constraint Refugee nations must be integrated into the economy of the host nation they have been relocated to.
- Objective
- Directive

- Constraint Policies should be implemented in order to create a peaceable financial union between refugee and host nations.
- Objective
- Directive

Background and Arguments

On the issue of crisis prevention and resolution, Jose Antonio Ocampo, Executive Secretary of the UN Economic Commission for Latin America and the Caribbean (ECLAC) said the emphasis was on information and transparency and less on regulation. But even in the midst of a crisis, the existing emphasis on these was a totally wrong solution and may in fact produce instability. The idea (of the IMF) of contingency financing in a crisis was an improvement on the old system and was particularly important for developing countries where current account questions were most important. But for such a scheme, the IMF had to have large funds available. If it had to depend on the major industrialized countries, and if there are doubts raised to the market about the availability or not of such funds, it would be a case of conveying wrong information to the market, and the mechanism could be destabilizing.

An orderly debt workout would be a good idea, but if it was going to be used on a case-by-case basis, it would be a total disaster, Ocampo said. And if such a scheme is sought to be imposed on a country, that too would worsen the situation, as had been shown in the case of Ecuador.

Developing countries, Ocampo said, should hence continue to strongly advocate total autonomy in the management of their

capital accounts, so long as there were no clear and agreed rules in this area.

Ocampo also advocated a reversal of the trends in the flows of official development assistance, the only source of foreign capital and funds for many poor countries. Just as national authorities have to take actions to ensure credit flows to small enterprises, there was an imperative need on the international front to reverse the current declining trends in ODA and to strengthen the multilateral financial systems to provide such funds. There may also be some merit in ensuring both international and regional and sub-regional funding and all these institutions providing service to the developing countries both in competition and in complementary roles. It was also necessary that developing countries should fight for ownership of social and development policies and not have externally oriented conditionalities by the multilateral institutions.

Defining Statement

Issue
Self-Sufficiency

20

Project

Massive Change:
Living in a World with Rising Seas

Originator

Albert Wang

Question at Issue

What level of self-sufficiency should be sought for communities and other political entities?

Contributors

Position

- Constraint Every individual political entities should seek for the highest self-sufficiency level as they can. Prepare the “resource backup” including food/water supply and energy by using the local easy reachable resource.
- Objective
- Directive

Sources

Diamond, Jared. *Collapse: How Societies Choose to Fail or Succeed*. 2006.

Alternative Position

- Constraint If the resource inside the country/area are not enough, at least they should sign up the “emergency support contract” with their neighbor country.
- Objective
- Directive
- Constraint
- Objective
- Directive

Background and Arguments

According to Jared Diamond's book *Collapse: How Societies Choose to Fail or Succeed* and many studies about successful society, the common insight is small unit of society which can be self-sufficiency is very important. Humankind used to exchange the resource by trading, transportation. But if one society depends totally on other society for key resources, the society becomes very fragile.

Under the trend of globalization, the effect of 3. and 4. become much more stronger. Specially the country have limited resource, the “resource back” is not only to storage the materials for emergency situation but also need the storage the solution Knowledge for strengthen the The ability of dealing with contingency.

For example, The Virgin in Greenland only last their culture for Hundreds years then totally collapse at the end, the 2 main reason is short of enough food supply and they have to depend on Norway for shipping the iron for making tool.

If we survey the 5 framework in *Collapse* to estimate why a culture/society will collapse or not, we can see how important self-sufficiency can be.

Five framework are:

1. Human destroy the natural environment and ecosystem.
2. Climate change.
3. Threat from strong neighborhood.
4. Weaken of neighbor society's support.
5. The ability of dealing with contingency.

Defining Statement

Issue
Technology

21

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

Should we support strategies to build infrastructure for living on water?

Contributors

Position

- Constraint
 - Objective
 - Directive
- The portfolio should include solutions that help marginalized groups adapt to living on the water

Sources

Ecoboot. http://www.ecoboot.nl/artikelen/floating_houses.php (accessed Sept 11, 2006).

Alternative Position

- Constraint
 - Objective
 - Directive
- The portfolio must only focus on solutions related to land use and protection.
- Constraint
 - Objective
 - Directive

Background and Arguments

Humans are stubborn and typically cling to their homes with ferocious tenacity. Ideas of land ownership and the sense of 'home' contribute to this intractability. This is clearly evidenced by the aftermath of the hurricane, Katrina. Many people from New Orleans refused to leave their homes despite repeated warnings, and in fact would like to rebuild their homes in the same location.

Under the looming threat of rising seas, the Dutch Transport, Public Works and Water Management Ministry is planning to give some land back to the ocean. In response, some groups are planning to create communities floating on the sea. In fact, companies have already started building floating houses.

Because humans are incredibly reluctant to give up the locality of their homes, our portfolio of recommendations should include strategies for building communities on the ocean

Defining Statement

Issue
Technology

22

Project

Massive Change:
Living in a World with Rising Seas

Originator

Gabriel Biller

Contributors

Eric Niu

Sources

Dutch Ministry of Transport, Public Works and Water Management. *The Delta Project for Safety, Wildlife, Space and Water*. The Hague, 2001.

Dutch Ministry of Transport, Public Works and Water Management. *A Different Approach to Water, Water Management in the 21st Century*. Ghent, Belgium: Snoeck – Ducaju & Zoon, 2000.

Kolbert, Elizabeth. *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. New York: Bloomsbury, 2006.

Question at Issue

What approach should be taken toward the use of emerging technologies and advanced science and engineering concepts?

Position

- Constraint
 - Objective
 - Directive
- Emerging technologies and advanced science and engineering concepts which show promise and are environmentally-sound **should** be pursued, while continuing to utilize proven, sustainable technologies.

Alternative Position

- Constraint
 - Objective
 - Directive
- The most economically feasible technologies **should** be employed to finance the discovery of more efficient, sustainable technologies.
- Constraint
 - Objective
 - Directive
- Multiple viable, environmentally-sound technologies **should** be adopted on a rolling basis to avoid a singular response to the problem.

Background and Arguments

In order to build a long-term, sustainable, and adaptive solution to the problems threatening coastal areas subject to rising sea levels, the portfolio of technologies and scientific and engineering methods and practices employed should avoid reliance on a single approach or technology. This will help avoid a situation of having "all ones eggs in one basket." Furthermore, it will position the system solution to adapt to rapid technological advances by allowing old components to be phased out and new components to be introduced while minimizing disruptions to the system.

As can be learned by looking at the automobile industry (particularly in the United States), most companies are currently relying almost 100% on the assumption of gasoline-powered engines in their vehicles, which, as the marketplace and demands of consumers are changing towards more environmentally-friendly vehicles, is causing them serious challenges in being capable of re-tooling to produce other types of vehicles (i.e., hybrid).

When the Dutch government responded to the disastrous flooding in 1953 – which left 200,000 hectares of fertile land engulfed in seawater, 1,835 people and 200,000 head of cattle dead, 72,000 people displaced, and 47,000 homes, factories and offices damaged – with the Delta Works project, they

approached the tremendous engineering challenge by tackling minor projects first and major projects later. This allowed them to develop the technological know-how along the way, learning as they went along, and experimenting with new, innovative techniques and systems. By the time they completed the massive systems project in 1997, the Dutch had positioned themselves as the world leaders in advanced water management systems and technologies.

While cost is an important factor in motivating any sort of action from businesses and individuals, it cannot be the driving factor anymore. We must instead consider the long term implications of our actions before evaluating any short term financial benefits.

There will not be a single "best" approach or technology to solve the problems of adaptation to a world with rising sea levels. Much like how stabilizing CO₂ emissions won't be achieved through a singular approach (refer to Robert Socolow's concept of fifteen possible "stabilization wedges"), there will be no single technological or scientific panacea. Therefore, the portfolio should seek to identify promising new technologies which can be integrated into the solution while continuing to utilize those sustainable technologies that are already proven.

Defining Statement

Issue
Technology

23

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

What approach should be taken toward the use of existing technologies and engineering concepts?

Contributors

Position

- Constraint
- Objective
- Directive

The most environmentally sound technologies available today should be utilized until more sustainable technologies are discovered.

Sources

Flannery, Tim. *The Weather Makers. New York: How Man is Changing the Climate and What it Means for Life on Earth.* Atlantic Monthly Press, 2005.

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

The most economically feasible technologies should be employed until more efficient, sustainable technologies are discovered.

Background and Arguments

Many current technologies do not employ sustainable practices. There is an enormous amount of waste, much of it dangerous and toxic. Such wasteful methods are, in fact, the major contributors to the situation we find ourselves in today. While past actions cannot be changed, the future should be approached with the awareness that we are custodians of our climate.

Science has demonstrated that even if our carbon emissions were to stop, the forces already in motion will continue. Were we able to accomplish such an ambitious goal, the planet would eventually reach a state of general equilibrium by 2050. By then, our influence on the climate will be greater than all natural influences. Instead of continuing to push the deteriorating situation, methods ought to be sought that will reduce further damage to our strained ecological systems.

While we cannot stop carbon emissions abruptly, we can begin to adopt more environmentally-sound methods. Because the atmosphere takes time to compensate for our waste, actions taken now will directly impact our children, not us. Thus, we must be aggressive in our actions now so that more unpredictable catastrophes can be averted.

While cost is an important factor in motivating any sort of action from businesses and individuals, it cannot be the driving factor anymore. We must instead consider the long term implications of our actions before evaluating any short term financial benefits. Ultimately long term benefits will supersede any short term gains.

Defining Statement

Issue
Time of Introduction

24

Project

Massive Change:
Living in a World with Rising Seas

Originator

Kristy Scovel

Question at Issue

For what time frame should the portfolio's system of tools be planned for implementation?

Contributors

Eric Niu, Gabriel Biller, Albert Wang, Natrina Toyong, Elisabeth Martinez De Morentin

Position

- Constraint
- Objective
- Directive

The system of tools should be immediately implemented in all affected regions and should be able to develop and evolve during the course of implementation.

Sources

Earth Policy Institute: <http://www.earth-policy.org/Updates/Update2.htm>
 BBC News: http://news.bbc.co.uk/1/hi/world/south_asia/3930765.stm
 Dr. Frederick W. Taylor: Institute for Geophysics, University of Texas-Austin, Texas
 Interviewed by: Earth & Sky Radio Series.
<http://www.earthsky.org/shows/observingearth.php?date=20030331>

Alternative Position

- Constraint
- Objective
- Directive
- Constraint
- Objective
- Directive

The system of tools ought to be completely established prior to beginning implementation.

The system of tools should be slowly integrated into the most receptive societies to test its effectiveness prior to global introduction.

Background and Arguments

During the twentieth century, sea level rose by 20-30 cms (8-12 inches). The Intergovernmental Panel on Climate Change projects a rise of up to 1 meter during this century. Sea level is rising because of the melting of glaciers and the thermal expansion of the ocean as a result of climate change. This in turn is due to rising atmospheric levels of CO₂, largely from burning fossil fuels.

As sea level has risen, nations are beginning to experience lowland flooding. Saltwater intrusion is adversely affecting its drinking water and food production. Coastal erosion is occurring.

The higher temperatures that are raising sea level also lead to more destructive storms. Higher surface water temperatures in the tropics and subtropics mean more energy radiating into the atmosphere to drive storm systems.

Island and low-lying coastal countries are threatened by rising sea levels. To the naked eye, the signs of climate change are almost imperceptible, but government scientists fear the sea level is rising up to 0.9cm a year.

Since 80% of its 1,200 islands are no more than 1m above sea level, within 100 years the Maldives (and similar countries) could become uninhabitable.

Studies show that a one meter sea level rise would result in the following land losses: 0.05% in Uruguay, 1.0% in Egypt, 6% in the Netherlands, 17.5% in Bangladesh and about 80% in the Marshall Islands. The Intergovernmental Panel on Climate Change (IPCC) estimates that if nothing is done to curb greenhouse gas emissions, the sea level will rise by around 65 cm (25 inches) by the year 2100. Many of islands and atolls are already now quite vulnerable to flooding caused by tsunamis (tidal waves) and storm surges.

Global climate change is expected to lead to increased storm activity, especially in the monsoon climates. Most small island nations are located in these climates.

Defining Statement

Issue
Time of Introduction

25

Project

Massive Change:
Living in a World with Rising Seas

Originator

Eric Niu

Question at Issue

Should we focus our strategies on adapting to gradual or abrupt changes in sea level?

Contributors

Position

- Constraint
- Objective
- Directive

Recommended strategies should focus on proactively adapting to a gradual change in sea level while realizing that some regions face more immediate concerns than others.

Sources

Lynas, Mark. *High Tide: The Truth About Our Climate Crisis*. New York: Picador, 2004.

Alternative Position

- Constraint
- Objective
- Directive

- Constraint
- Objective
- Directive

Recommended strategies must be implemented as soon as conceivably possible in order to prepare solutions that can later be adapted to changing conditions.

Background and Arguments

While changes in our atmosphere and the subsequent consequences are happening very rapidly relative to the greater Earth timeline and changes are noticeable within a single human lifetime, they are ultimately slow relative to modern technology's ability to create and adapt. Scientists predict that the melting of the polar ice cap is almost inevitable, but might take hundreds of years.

In Tuvalu, the islands are slowly being consumed by the ocean. While the government has decided to relocate from the island, the sea is rising at slow enough a pace that the relocation can happen gradually over the course of a number of years.

Therefore, while recommendations in the portfolio should be introduced early in order to proactively prepare for adaptation, such implementations can ultimately afford to occur gradually in order to avoid panic and hysteria.

Defining Statement

Issue
Time Of Introduction

26

Project

Massive Change:
Living in a World with Rising Seas

Originator

Natrina Toyong

Contributors

Sources

Doyle Alister, INTERVIEW - World Needs Far Tougher Action on Warming - UN. REUTERS NEWS SERVICE, August 9, 2006. http://unfccc.int/files/press/news_room/unfccc_in_the_press/application/pdf/ydb_08092006_reuters_world_needs_far_tougher_action.pdf

5th Earth Summit Report, New York, 23-27 June 1997.

Question at Issue

What should be the basis for setting the timing goal in the project portfolio of Global Warming Issues?

Position

- Constraint The allocation of project time frame must depend on the severity of Global Warming effects and causes surrounding the individual areas concern.
- Objective
- Directive

Alternative Position

- Constraint
- Objective The duration of time for any project portfolio should be able to consider uncertainties and possible drawback based on tailor made assessment without affecting the predetermined time frame.
- Directive
- Constraint
- Objective The timing should be realistic to the current speed and effort that most of today's nation are able to sacrifice, without considering pushing forward to meet deadlines.
- Directive

Background and Arguments

Citing the efforts by some of the world's industrialized country on the fight on Global Warming, it is estimated that there will be an emission reduction of 60 to 80 percent by the year 2050.

This in itself is a projection time frame that seems promising in an important and serious guided direction that most industrialized country is embracing.

The questionable matter is whether this is an over estimated projection and what are the tools for calculating what is achievable by standard of a changing climate. The portfolio design for Adapting to Climate Change should be able to calculate this and make precise adjustment measures to accelerate any set back in plan implementation.

Consider the following timeline. World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC) in 1988, authorized to assess the state of existing knowledge about the climate system and climate change; the environmental, economic and social impacts of climate change; and possible response strategies. Following that, intergovernmental conferences focusing on climate change were held in the late 1980s and early 1990s. The Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC) had met for five sessions between

February 1991 and May 1992. These meetings an attendance of negotiators from 150 countries from all over the world. Finalization was met in 15 months, adopted in New York on 9 May 1992 and opened for signature several weeks later in Rio.

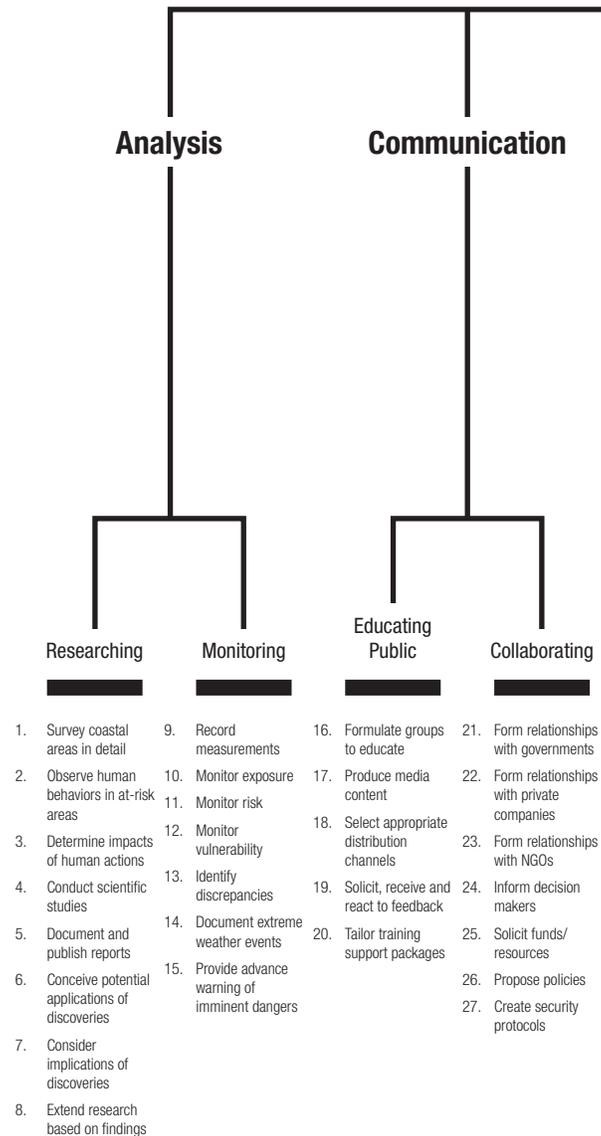
This a definite good start by measure of paper but what comes after remains vague speculation. Unless and until all entities down to the minute of details can be calculated and its result correlated into an achievable timeline, the world may come across bad case scenario where all efforts becomes obsolete with time and are no longer adaptable to ever changing climate.

The general timeline to be proposed in the portfolio will need to meet both the short term and long term needs. There is certainly a need to push the sense of urgency, especially in adaptation processes. The longer the project is delayed, the greater the risks and lost will be. Working at the speed that everyone is ready to work today may not work as well in the future condition that are yet to be known. One thing is certain though, at the rate of how the climate is changing today, it is expected that the future effort will need to be doubled as the multitude of risk and damages will be higher.

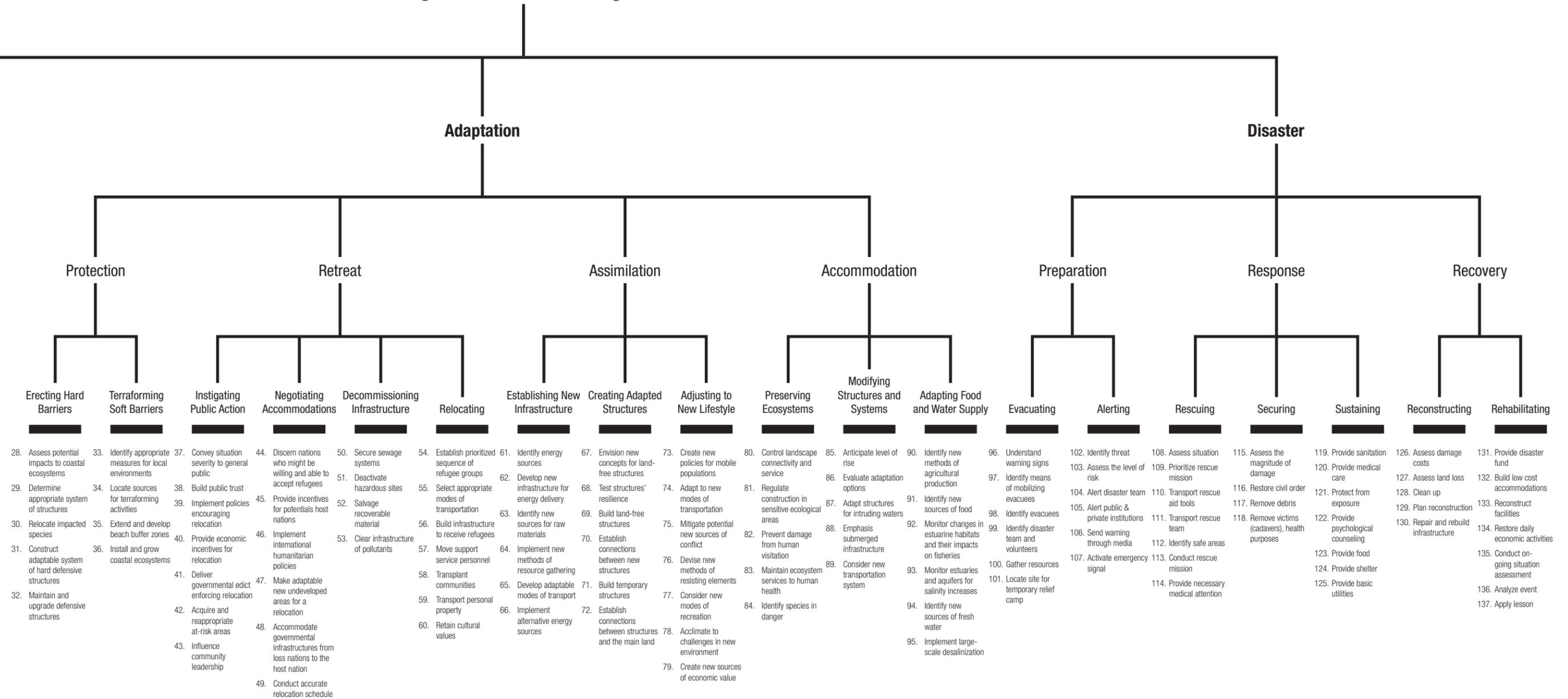
Function Structure

Massive Change: Living in a World with Rising Seas

Last Updated: 19 October 2006



Living in a World with Rising Seas



Design Factor

Documentation not checked for accuracy

1

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Analysis

Activity

Researching

Originator

Gabriel Biller

Contributors

Sources

"Academic publishing."
Wikipedia. http://en.wikipedia.org/wiki/Academic_publishing
(accessed Oct 19, 2006).

Associated Functions

5. Document and publish reports

Observation

As the amount of research related to global warming, climate change, and sea level rise continues to grow and expand, it is possible that some published reports, papers, and articles may not undergo a thorough review process to be checked for scientific accuracy.

Extension

It is generally accepted in academic publishing that an article or paper is not considered valid until it undergoes a peer review process by other scholars. The entire process for reviewing and publishing an article, therefore, may take several months or longer. This helps avoid the possibility of plagiarism or publication of false data or unsound scientific study. Of course, sometimes mistakes will slip through the cracks, but this is not necessarily common.

The only way to ensure accuracy is to make published papers available to as many knowledgeable scholars and critics as possible for review and commentary. This is increasingly accomplished through online submission and review.

Design Strategies

Create monitoring groups to review all newly published research

Establish independent review organizations

Solution Elements

S ResearchMonitor

S Intergovernmental Science Journal

S Watchdogs

Design Factor

Unable to control the spread of disease

2

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Adaptation : Protection

Activity

Erecting Hard Barriers

Originator

Gabriel Biller

Contributors

Sources

Invasive Species Unit. 2006.
"Setting the Stage for 21st
Century Plant Protection."
Minnesota Department of
Agriculture. <http://www.mda.state.mn.us/invasives/default.htm> (accessed Oct 19, 2006).

Associated Functions

30. Relocate impacted species

Observation

The erection of hard barriers, such as levees, dams, and other water barriers can have negative impact on species who are no longer able to migrate up and down stream. However, by relocating impacted species, we may inadvertently alter ecosystems in a detrimental way, including potentially spreading disease through invasive species.

Extension

According to the Minnesota Department of Agriculture, the "means by which invasive species are imported or introduced into new environments are called pathways." In a globalized world, the number of possible pathways is ever growing, and includes people, animals, trains, planes, cars, and ships, which may carry non-native species or plant pathogens into a new environment.

Some more facts: 1) 4,500 invasive species have gained a foothold in the U.S. in the past 100 years, 2) invasive species contribute to the decline of 46% of the imperiled or endangered species in the U.S., 3) after loss of habitat, biological invasion of foreign species is the greatest threat to native organisms and biodiversity, and 4) invasive species cost an estimated \$137 billion annually in losses to agriculture, forestry, fisheries, and maintenance of open waterways.

Design Strategies

Eliminate pathways for spread of invasive species
Identify differences in neighboring ecosystems prior to erecting hard barriers between them
Monitor ecosystems on both sides of hard barriers following their erection
Destroy invasive pathogens
Allow bypassing of barriers for mobile species

Solution Elements

S AirRAID
E Fish Ladders
E Open Storm Surge Barriers
S EcoMonitor

Design Factor

Citizens feel disenfranchised

3

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Adaptation : Retreat

Activity

Instigating Public Action

Originator

Gabriel Biller

Contributors

Sources

Perry, Ronald W and Michael K Lindell. 1997. "Principles for Managing Community Relocation as a Hazard Mitigation Measure." *Journal of Contingencies and Crisis Management* 5, no 1: 49-59.

Fairchild, Amy L, James Colgrove, and Marian Moser Jones. 2006. "The Challenge of Mandatory Evacuation: Providing for and Deciding for." *Health Affairs* 25, no 4: 958-967.

Associated Functions

- 38. Build public trust
- 39. Implement policies encouraging relocation

Observation

Individuals living in a potentially unsafe area (with respect to dangers of rising sea levels) may be first encouraged and then forced by law to evacuate permanently. This may lead them to feelings of resentment and disenfranchisement.

Extension

When Mayor Ray Nagin of New Orleans became absolutely certain of Hurricane Katrina's imminent arrival, he declared a state of emergency and ordered an immediate evacuation of the city. Most of the city's 1.3 million metropolitan residents evacuated, but, as we are all aware, many were either unable to leave because of a lack of means or refused to leave behind their homes.

Evacuation warnings for impending disasters are typically not heeded by all. There are various reasons for this, but among them are a lack of faith in the authorizing officials, particularly after evacuations are ordered, but the predicted disaster fails to strike. Fairchild, et al explain that polls have found that 1/3 to 1/2 of people recently surveyed cited lack of confidence in officials as a reason not to evacuate. In fact, "Ray Nagin underscored this point when he argued that a rash mandatory evacuation order issued by one of the city's parish presidents the prior year 'had the effect of lowering public confidence on exactly when they would listen to a public official as far as ordering a mandatory evacuation'" (Fairchild, et al, 2006).

Perry and Lindell studied the use of permanent relocation of communities as a risk-mitigation strategy for danger-prone areas. They talk about the successful relocation of the town of Allenville, Arizona, and principles that can be followed to help with the inherent problems of relocation strategy, including the issue of the intrusion into citizens' lives. Too often, relocatees feel as if they are being forced to suffer inconveniences and disruptions to their lives for the benefit of others (Perry and Lindell, 1997).

Design Strategies

- Keep community organized and united before, during, and after the relocation
- Maintain communication and control rumors
- Ensure all citizens are well-informed
- Maintain positive morale among community
- Provide relocatees with incentives to comply
- Involve citizens early in the process
- Emphasize the urgency of the situation
- Preserve social networks
- Attend to social and personal needs of citizens

Solution Elements

- S** Multi-channel CommunityNet
- S** Relocation Incentive Program
- S** "My Home" Time Capsules
- S** "Planning Our Future" Volunteer Program

Design Factor

Political and power discrepancy to gratify nations collaboration/help

4

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Adaptation : Retreat

Activity

Negotiating Accommodations

Originator

Gabriel Biller

Contributors

Sources

Lynas, Mark. **High Tide: The Truth About Our Climate Crisis**. New York: Picador, 2004.

Personal Observation

Associated Functions

44. Discern nations who might be willing and able to accept refugees
45. Provide incentives for potential host nations

Observation

Relocation of large populations of citizens might require negotiations with other municipalities or nations, and it may be difficult to provide them incentives from a weakened political position.

Extension

Tuvalu is a small, Polynesian island nation in the South Pacific. It is the second-least populated country in the world, but its likely to be the first nation to completely disappear as a result of rising sea levels. Nearly the entire island is no more than 5 meters above sea level. Tuvalu has virtually no economy and relies heavily on foreign aid.

In the year 2000, the government of Tuvalu asked the nations of Australia and New Zealand to offer homes to its citizens, citing that they would soon be environmental refugees. Australia refused, claiming that according to their own scientists, Tuvalu is not subject to significant sea level rise and will not soon be submerged, and that they (Australia), have no responsibility to accept refugees. New Zealand has agreed to accept 75 refugees per year for the next 30 years.

What this real situation reveals is that there will be major challenges in the future with relocating large communities, or even nations, to new municipalities or nations. Refugees are rarely welcomed warmly, as was evident with New Orleans evacuees who were relocated to Houston after Hurricane Katrina. Nations or communities wishing to relocate their evacuees may have to provide incentives to host nations or communities, but may not have the power or resources to do so.

Design Strategies

- Seek partners to increase negotiating power
- Seek out other potential host nations or communities
- Appeal to host nations' sense of guilt by reminding them of their share of complicity in the problem of global climate change
- Appeal to moral duty to preserve cultures

Solution Elements

- S** Global Cultural Preservation Initiative
- S** Alliance of Nations and Communities At-Risk (ANCAR)

Design Factor

Tests fail to adequately detect reliability of structures

7

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Adaptation : Assimilation

Activity

Creating Adapted Structures

Originator

Gabriel Biller

Contributors

Sources

Hart, Kelly. 2006. "Building Codes." Green Home Building. http://www.greenhomebuilding.com/building_codes.htm (accessed Oct 20, 2006).

Taylor Martin, Susan. 2005. "A home that rises with the water." Ecoboot (reprinted from The St. Petersburg Times). <http://www.ecoboot.nl/artikelen/SusanMartinHomeRisesWithWater.html.php> (accessed Oct 20, 2006).

Associated Functions

68. Test structures' resilience

Observation

Assimilation of the sea into our way of life will involve designing and building new kinds of structures that can exist on the water safely. This will require testing of new structures to ensure safety and resilience to environmental elements.

Extension

Building codes exist, essentially, to insure safety and adherence to recognized building standards. The intent is generally well-meaning, but can sometimes lead to the assurance of uniformity, rather than safety, as some commentators might argue (Hart 2006). This is often the case with new types of building or structures, where codes may not yet exist, and thus innovative or new ways of building can potentially be stifled by the code books. Commentators like Hart are concerned that vernacular building styles may become victim to modern codes. In places like the Netherlands, where new techniques and types of amphibious architecture are being developed and experimented with, it is still a common occurrence for authorities to not permit building structures for which there are no codes or rules (Taylor Martin 2005).

The International Code Council (ICC) is a non-profit, membership association, dedicated to building safety and fire prevention. The ICC has a process for developing new code, which allows anyone to submit change proposals and participating in debates and proceedings with representatives from the industry. New types of amphibious or other architecture can be faster accepted, and consequently faster be made safer and subject to inspection, if simultaneous action is taken to update the standards or codes.

Design Strategies

Create and enforce mandatory testing protocol for new types of structures
Implement redundancy into testing procedures
Participate in creating safety standards or codes for new types of structures

Solution Elements

- S** FutureStructure Testing Protocol
- S** Committee for FutureStructure Safety

Design Factor

Challenges greater than desire to adapt

8

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Adaptation : Assimilation

Activity

Adjusting to New Lifestyle

Originator

Gabriel Biller

Contributors

Sources

Kabat, Pavel, Wim van Vierssen, Jeroen Veraart, Pier Vellinga, and Jeroen Aerts. 2005. "Climate proofing the Netherlands." *Nature* 438, no 17: 283-284.

Personal Observation

Associated Functions

78. Acclimate to challenges in new environment

Observation

The gradual nature of sea level rise (SLR) and the other available strategies for adaptation to SLR might make assimilation seem like too great a leap for some people to make. Becoming accustomed to a new way of life living on the water may be too challenging for some individuals to want to adapt.

Extension

Learning to live on the water is not an entirely new concept. It does not imply living the life of a sailor at sea for prolonged periods of time. There are many examples of people adapting to and embracing life with water, particularly in the Netherlands.

Many architectural firms in the Netherlands, in fact, are specializing in water-architecture and building methods suitable for life on the water. These firms are exploring new building typologies, including the idea of the dwelling-ark. Engineers in the Netherlands are at the forefront of water management technology. What this means is that innovative architects and engineers are working together to not only make life on the water feasible and viable, but desirable as well. By embracing the challenge to adapting to a new way of living, it is conceivable that future advancements could make the transition to an aquatic life relatively easy and, perhaps even, exciting.

Some Dutch scientists even suggest that adapting to life on water could generate great opportunities for large-scale innovation. Kabat et al propose the idea of a large "hydrometropole," essentially a floating city in which we learn how to live with and make a living from water.

Design Strategies

- Make adaptation fun
- Reward those who accept the challenge
- Provide counseling to those experiencing difficulty with adaptation
- Demonstrate commitment to vision of a future life on water
- Emphasize the great opportunities for life in a new type of city

Solution Elements

- S** AquaGames
- S** Water-living Support Networks
- S** "The Future is Wet, the Future is Great!"

Design Factor

Emergency signal does not suggest level of emergency

11

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Disaster : Preparation

Activity

Alerting

Originator

Gabriel Biller

Contributors

Sources

Hooke, William H. 2005.
"Avoiding a catastrophe of human error." *Bulletin of the American Meteorological Society* 86, no 2: 156-158.

Associated Functions

107. Activate emergency signal

Observation

Existing warning systems vary in the amount of information that they provide, depending on their level of sophistication. In addition, they may not provide enough information to those in danger, or may fail to be clear and understandable to all.

Extension

William H. Hooke, director of the AMS Policy Program and chair of the Disaster Roundtable of the National Academies of Science/National Research Council, writes that there are several measures we can take to avoid losses in the face of catastrophes. In addition to using advanced technical capabilities for monitoring conditions, we must also warn those most in danger. "When information on an impending hazard is available to only a few government officials, it is virtually useless," he says. "The warning must be in the hands of the public – those of us in harm's way. For many events, such as earthquakes and tsunamis, the warning time is too short to rely on the handoff of information between intermediaries" (Hooke 2005). Warning systems can disseminate information via radio, cell phones, pagers, and other technologies.

To be successful, it is critical that emergency warning systems be complete, unambiguous, and intelligible to their recipients. When possible, such systems should indicate the actions that those in danger should take, rather than providing incomplete information and leaving the recipients to make uninformed decisions. In addition, warning systems become even stronger when accompanied by educational programs that prepare individuals with disaster information and scenarios.

Design Strategies

Provide complete, clear, unambiguous alerts
Transmit emergency warnings and alerts directly to users, in language they understand

Solution Elements

- S Disaster Alert System
- S Disaster Training 101

Design Factor

Insufficient resources for rescue missions

12

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Disaster : Response

Activity

Rescuing

Originator

Gabriel Biller

Contributors

Sources

Personal Observation

Associated Functions

- 110. Transport rescue aid tools
- 111. Transport rescue team
- 113. Conduct rescue mission
- 114. Provide necessary medical attention

Observation

Time and proper resources are critical to the success of rescue missions following disasters, but often the appropriate resources are not available on time and as needed to respond immediately and effectively.

Extension

The failure of the rescue, management, and recovery missions during and after Hurricane Katrina have highlighted many of the problems with disaster anticipation, preparation, and management of FEMA and other agencies.

While supplies for victims and rescuers may have been available, there may have been logistical issues preventing them from being properly deployed. For example, we have all seen photographs of fields full of FEMA trailers ready, but waiting to be taken somewhere.

For the most part, disasters in the United States have not been lacking in material support, rather the logistics and processes for getting the needed supplies and resources where they need to be delivered. This is an issue of high-level management of missions, as well as providing the transport and means for getting material to its proper location expeditiously.

Design Strategies

- Anticipate needs prior to disaster events
- Develop support network for rescue workers
- Provide logistical support and effective supply chain in the field

Solution Elements

- S** Medical Response Vehicles (sea, air, and land)
- S** Standard Issue Rescue Gear
- S** Rescue Mission Management Software and Dashboard (RMMS&D)

Design Factor

Effluent may contaminate food and water supplies

13

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Disaster : Response

Activity

Sustaining

Originator

Gabriel Biller

Contributors

Sources

U.S. Environmental Protection Agency. Sept 26, 2006. "Response to 2005 Hurricanes: Frequent Questions." U.S. EPA. <http://www.epa.gov/katrina/faqs.htm> (accessed Oct 17, 2006).

Centers for Disease Control and Prevention. Sept 14, 2005. "Keep Food and Water Safe after a Natural Disaster or Power Outage." CDC. <http://www.bt.cdc.gov/disasters/foodwater.asp> (accessed Oct 17, 2006).

Associated Functions

119. Provide sanitation
123. Provide food

Observation

The most immediate health threat following flooding as a result of a natural disaster is contamination of drinking water. Sewage and septic systems, as well as chemical toxins, and other pathogens and bacteria all contribute to potentially unsafe food and water supplies.

Extension

According to the Environmental Protection Agency (EPA), drinking water may be contaminated after flooding with effluent or waste from sewage and septic systems, household chemicals, chemical facilities, oil refineries, and other sources. Parasites and bacteria can also become present at high concentrations in the water supply following disasters, leading to illness and even death if ingested.

The Centers for Disease Control and Prevention (CDC) also warn of potentially unsafe food and water during and after emergencies. This can be due to lack of safe drinking water, direct contact with effluent or contaminated water sources, or lack of refrigeration of perishable foods due to lack of electricity.

Hurricane Katrina in 2005 and the Asian tsunami of 2004 highlight the magnitude of the issue of safe drinking water and food in the aftermath of massive catastrophes. Bathing in, drinking, cooking with, washing in, or simply touching contaminated water can be dangerous. Uncontaminated bottled water is probably the best source of safe water. Boiling potentially contaminated water is the next best option. And, finally, chemical treatment is another option that can help when boiling is not possible.

Design Strategies

Provide water
Provide food
Provide methods for effectively disinfecting water
Provide education/training on food and water safety
Construct water and food supply systems that are disaster-proof

Solution Elements

M SafeWater Vehicles
M SafeFood Vehicles
S Personal Water Boilers
S Disaster Training 101
S WaterWerks and FoodWerks

Design Factor

Violence erupts over distribution of food, water, and other resources

14

Project

Massive Change:
Living in a World with Rising Seas

Mode : Submode

Disaster : Response

Activity

Sustaining

Originator

Gabriel Biller

Contributors

Sources

Centers for Disease Control and Prevention. Aug 2, 2006.
"Preventing Violence after a Natural Disaster." CDC. <http://www.bt.cdc.gov/disasters/violence.asp> (accessed Oct 16, 2006).

World Health Organization, Department of Injuries and Violence Prevention. 2005.
"Violence and Disasters." WHO. http://www.who.int/violence_injury_prevention/publications/violence/violence_disasters.pdf (accessed Oct 16, 2006).

Associated Functions

123. Provide food

Observation

In the aftermath of catastrophic events, particularly when people are suffering and there is a lack of order, lawlessness can occur and violence can erupt over the distribution of resources.

Extension

According to the Centers for Disease Control & Prevention (CDC), the increased stress that people experience from family and life disruptions, challenges in meeting daily needs for food, water, and shelter, and disruptions in the health and law enforcement services of a society following a disaster can increase the likelihood of violence.

They suggest strategies "focused on providing assistance to individuals in need and developing supportive networks for managing daily tasks" (CDC 2006). These include prevention of child maltreatment, shaken baby syndrome, sexual violence, suicide, and youth violence, as well as managing stress in relationships.

The World Health Organization (WHO) supports these contentions, though it states that no thorough studies have been conducted. Anecdotal evidence indicates increases in domestic violence, child abuse, and sexual violence. There is also evidence that long-term effects of a disaster can lead to increased crime and community violence. Factors include increased stress, feelings of powerlessness, loss of property/livelihood, PTSD, scarcity of basic provisions, destruction of social networks, breakdown of law enforcement, cessation of social programs, and economic disruptions.

Design Strategies

Increase law enforcement
Increase monitoring and surveillance
Strengthen community networks
Educate population on emergency procedures and protocols
Protect displaced children
Provide ample supplies of basic provisions
Create safe havens

Solution Elements

M Child Registry
M Community Watch
S Disaster SafeZones
S Disaster Training 101

Design Factor

Communication system failure

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Educating public

Originator

v

Contributors

Sources

- "Katrina: Hurricanes, Catastrophes, and Risk Communication" by Peter M. Sandman
<http://www.psandman.com/col/katrina.htm>
 - "Survey of Hurricane Katrina Evacuees" Kaiser Family Foundation
<http://www.kff.org/newsmedia/7401.cfm>
 - "Development, Democracy, and the Village Telephone," Harvard Business Review, by Sam Pitroda

Associated Functions

Solicit, Receive and React to Feedback

Observation

The failure of communication administrating system always revel in the emergency event but also will influence the advancement of society. The cause of failure related to lack of disaster conscious, financial shortage and lack of supervisory system. The effect is entity can't communicate important information.

Extension

In the short term point of view, take Katrina for example, base on the "Survey of Hurricane Katrina Evacuees" by Kaiser Family Foundation. This survey diagnose the evacuees in Huston that point out among the people who doesn't evacuate in advanced, half of them never heard the evacuation order of can't understand it. In certain point of view the communication gap is a very serious problem. There are some directions of improve Ineffective communication administrating system.

Long term:

1. Design the communication infrastructure for extremely situation. Maintain the basic infrastructure such as radio that won't destroy by all kinds of disaster.
2. Communication maneuver: build the public cognition of disaster information. Keep the information window be simple. One TV channel, hot line or radio station .

Short term:

1. The power and effect of warning should be equal to the level of emergency.
2. The warning communication system should consider cognition challenge population.

In the long term point of view, take India's telecommunication infrastructure for example, in the early 60s, the issue of modernization impact India's society, not taking the basic livelihood needs as the first order but telecommunication. And base on the financial ability, technology ability, climate and culture situation. They develop the telecommunication system which is base on the entity of village, which set the telephone in small grocery store which support by small, high climate adaptability and low cost digital switch. This is a good example that how to build appreciate efficient communication based on critical situation.

Design Strategies

Design the communication infrastructure which is low lost, easy to main and won't destroy by extremely disaster.

How to let most of the population know how to find disaster information by "first thought"

The power and effect of warning should be equal to the level of emergency.

Solution Elements

M The communication principle of "how to scare people" for government warning decision maker.

M Exclusive area radio (EAR)

Design Factor

Timeliness and relevance of reports over time

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Albert Wang

Contributors

Sources

Personal observatiopn
FEMA
IPCC

Associated Functions

Document and publish reports

Observation

The isolate research group lack of appropriate channel or platform to communicate important disaster information.

Extension

Most of the nature disaster are hard to anticipate, and be content with the current situation is human nature. The growing of population and city scale meet bigger nature disaster cause lager scale of society damage, hurricane Katrina and south pacific tsunami are examples reveal the problem of century. The decision maker need specific, accurate information for long term planning and short term disaster response. But the problem right now is there are too many information can be approach sometimes decision maker can't access the appropriate information timeliness or there no appropriate information at all. There should be few steps that can build the disaster information needs appropriately.

0. Constantly collect disaster information include
 - a. The lesson from pervious and other places' disaster
 - b. Understand the current situation in local area in detail
 - c. The research related to local area
1. Stimulated the worst case scenario for local situation.
2. Identify the lack of certain information
3. Held research by customized needs
4. Transfer the disaster information to disaster principle for long term planning and short term disaster response.

Any mistake happen in the steps will cause decision making failure. So the solution of lack of Timeliness and relevance of reports over time should strengthen step 0. 2. 3. to integrate appreciate information.

Design Strategies

- Collect related research
- Stimulated the worst case scenario
- Held research by customized needs
- Transfer the disaster information to principle

Solution Elements

- M** Research monitor (an organization will intuitively trace the research result and evaluate it by the strategy needs)
- M** Worst scenario stimulation software

Design Factor

Methods of collecting global data are not appropriate

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Monitoring

Originator

Albert Wang

Contributors

Sources

-Personal observatiopn
 -FEMA
 -IPCC
 -Urban search and rescue (US&R)
<http://www.fema.gov/emergency/usr/index.shtm>
 -HAZUS Multihazard Loss Estimation Program
<http://www.nibs.org/hazusweb/index.htm>
 -Global alliance for disaster reduction
<http://www.gadr.giees.uncc.edu/index.cfm>

Associated Functions

Record measurements

Observation

The disaster information always record and monitor in the local scale, as a global scale, decision maker have to deal with the ocean of disaster information, it is hard to find patterns and trends in this way.

Extension

The purpose of this design factor is to initiate establishing a basis for standardized disaster data collection. One of the major needs following a disaster is consistently collected damage and loss data that can be utilized by federal, state and local agencies for future planning for mitigation, emergency preparedness and response and recovery. Loss estimation, used to support these activities, requires comprehensive post disaster data for model validation and development. Data needs for validating the HAZUS Multihazard Loss Estimation Program (<http://www.nibs.org/hazusweb/index.htm>) provide a basis for initiating a common data collection format. Further study is needed to identify data collection requirements for other mitigation or emergency planning related purposes such as urban search and rescue (US&R)(<http://www.fema.gov/emergency/usr/index.shtm>). Social losses to disadvantaged groups also need to be addressed.

The standardized disaster data collection also should develop global scale database. If the local data can follow the same record format, this will help global data integration easier. In the global level of decision making, such as environmental policy, international resource networking, global improve of at risk area.

Design Strategies

Develop method for global scale data collecting.

Narrow local data into simple, understandable index number, to understand problem more directly.

Solution Elements

- M** 1. DIN (Disaster Index Number) system (The local situation info will summarized into a simple number in a appropriate scope)
- M** 2.Global disaster info analysis institute (The organization develop global scope research method)

Design Factor

No means to recover business after disaster

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster : Recovery

Activity

Rehabilitating

Originator

Albert Wang

Contributors

Sources

Personal observation
FEMA, GuideSustainability 1
chap 6
<http://www.fema.gov/library/file?type=publishedFile&file=364ch6.pdf&fileid=fc6b2550-46ef-11db-a421-000bdba87d5b>
IPCC

Associated Functions

Restore daily economic activities

Observation

The damage of economic is hard to recovery after disaster.

Extension

The Great Midwest Flood of 1993 affected more than 250 businesses – about 76 percent of the local businesses were able to re-open after the disaster. While not every community will suffer such extreme business losses following a disaster, many small to mid-sized businesses will not have the financial reserves to survive an extended disaster recovery process. Businesses, particularly those that lease rather than own their facilities, generally do not have adequate insurance to cover the repair costs or coverage for equipment, inventory, and revenue disruptions. Helping businesses to plan for and recover from disasters is a vital aspect of creating more sustainable communities. When businesses fail, the whole community struggles to recover. There is a reduction in goods and services that residents have come to depend upon, a loss of jobs, and substantial reductions in the local tax base. Clearly, this undermines the economic viability and hence the livability of the community. To assist community's recovery efforts, the following should be consider.

- **Integrate mitigation and economic recovery planning.** Connect business recovery operations with disaster mitigation concepts early in the recovery process. Encourage new business development in ways that make it more disaster resistant.
- Designate a single point of contact.** Select someone to be responsible for assisting the business community with economic recovery activities.
- Establish temporary business sites.** Create a location for businesses affected by the disaster to operate until they can reopen in permanent locations.

Design Strategies

Enhance motivation of repair emergency communication system.

Solution Elements

- M** Safe earth competition (use the competition as an event to encourage community participation)
- M** Collaboration tax discount (the tax policy encourage community and cooperation support the process)

Design Factor

Policies lack popular or organizational support

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Collaborating

Originator

Albert Wang

Contributors

Sources

Personal observation
FEMA
IPCC

Associated Functions

Form relationships with governments
Form relationships with private companies
Form relationships with NGOs
Propose policies

Observation

The local government or public always think that the central policy is not realistic and useless.

Extension

The key issue of policies lack popular or organizational support is almost a communication gap problem. There are also many methods we use in modern political communication, one of the most powerful one is political campaign. Any political campaign is made up of three elements. The modern mnemonic is message, money, and machine. The message is a concise statement saying why public should pick a certain policy. In a modern political campaign, the message must be carefully crafted before it is spread. Major campaigns will spend hundreds of thousands of dollars on opinion polls and focus groups in order to figure out what message is needed to reach a majority. 'Machine' represents human capital, the foot soldiers loyal to the cause, the true believers who will carry the run by volunteer activists. Successful campaigns usually require a campaign manager and some staff members who make strategic and tactical decisions while volunteers and interns canvass door-to-door and make phone calls. Large modern campaigns use all three of the above components to create a successful strategy for victory.

Design Strategies

Enhance motivation of repair emergency communication system.

Solution Elements

M Entertainment disaster education (use the marketing technique the communicate disaster content)

Design Factor

Infrastructures which has pollution potential are hard to dislocation

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Retreat

Activity

Decommissioning infrastructure

Originator

Albert Wang

Contributors

Sources

Personal observation

Microbe May Be A Key To Mine
Pollution
<http://www.science-daily.com/releases/2000/03/000313081011.htm>

Associated Functions

Secure sewage systems

Observation

1. The pollution will stay under water “forever”
2. The sewage will leak for a long time.
3. Coastline ecosystem will be destroy and influence human health

Extension

Just like the mining industry struggle for centuries, the pollution of sinking toxic material will bring huge impact to the ecosystem. The same condition we meet right hear is the once the infrastructure such of sewer system submerge by the rising sea. The toxic material will pollute the water area for more than decades. So the strategy right here would be

1. Prevent pollution before sea level rising and city relocation.
2. Reduce pollution after sea water submerge.

This two strategy also can reference the technology used in current mining industry. For example, in the recent research discover a new type of microbe. It shows an ability to transform the sulfide found in metal ores to sulfuric acid, the chemical pollutant that contaminates mining sites and drains into nearby rivers, streams and groundwater.

Design Strategies

Enhance motivation of repair emergency communication system.

Solution Elements

- M** Pollution cover/ structure (the add the new structure on the potential pollution structure)
- M** New Infrastructure construct standard
- M** Purify system build in (such

Design Factor

Recreational venues not found in abundance

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Assimilation

Activity

Adjusting to new lifestyle

Originator

Albert Wang

Contributors

Sources

Personal observation
-Epidemiological Facts about PTSD
http://www.ncptsd.va.gov/facts/general/fs_epidemiological.html
-National Meditation Center
for World Peace
<http://www.nationalmeditation.org/>

Associated Functions

Consider new modes of recreation

Observation

The public who experience disaster are particularly vulnerable, the major need of the public is mental peace .

Extension

People who experience large scale of disaster who also is the high-risk group of Post-traumatic stress disorder (PTSD). PTSD is a term for certain psychological consequences of exposure to, or confrontation with, stressful experiences that the person experiences as highly traumatic. The experience must involve actual or threatened death, serious physical injury, or a threat to physical and/or psychological integrity.

In recent history, the Indian Ocean Tsunami Disaster, which took place December 26, 2004 and took hundreds of thousands of lives, as well as the September 11, 2001 attacks on the World Trade Center and The Pentagon, may have caused PTSD in many survivors and rescue workers. Today relief workers from organizations such as The Red Cross and the Salvation Army provide counseling after major disasters as part of their standard procedures to curb severe cases of post-traumatic stress disorder.

Other agencies, such as the National Meditation Center for World Peace , have created similar special programs. The NMC trains agencies such as crisis centers NGOs and works with international agencies to prevent trauma to children.

Other information concerning prevalence of PTSD is that females have a higher rate of PTSD than do males, and Hispanics have higher rates of PTSD than do other ethnicities.

Design Strategies

Enhance motivation of repair emergency communication system.

Solution Elements

M Peaceful village program

Design Factor

New food/water sources are expensive

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accommodation

Activity

Adapting food and water supply

Originator

Albert Wang

Contributors

Sources

Personal observation
-Engineers Develop Revolutionary
Nanotech Water Desalination
Membrane
<http://www.science-daily.com/releases/2006/11/061106144813.htm>

Associated Functions

Identify new sources of fresh water

Observation

The major fields which produce large amount of food will be submerged under rising sea. The supply of food/clean water will reduce.

Extension

In the future of rising sea, lots of crop fields would be submerged and the source of fresh water will face shortage. The new source of food and water might be very expensive. The key issue will still be the shortage of fresh water, that both can support human drinking and raise crops. There are many researches are working on desalination of salt water right now. One of the key innovations is using nanotechnology material to decrease the cost of desalination. Researchers at the UCLA Henry Samueli School of Engineering and Applied Science have announced they have developed a new reverse osmosis (RO) membrane that promises to reduce the cost of seawater desalination and wastewater reclamation. Once the core problem: fresh water shortage can be solved, the market balance of food and water has a chance to be stabilized.

Design Strategies

Enhance motivation of repair emergency communication system.

Solution Elements

M Open source high efficiency agriculture technology program.

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Eric Niu

Contributors

Sources

An Inconvenient Truth > The Science. <http://www.climate-crisis.net/thescience/> (accessed Nov 26, 2006).

Associated Functions

Consider implications of discoveries

Extend research based on findings

Observation

As new findings are discovered, previous applications may become obsolete or formerly accepted concepts might be invalidated.

Extension

The most relevant example of technological implications invalidating old discoveries lies in our methods for producing energy. Currently, most of our energy is produced by burning fossil fuels, whether it is the coal in our power plants or the gasoline in our cars. However, recent discoveries verify that carbon dioxide emissions from burning fossil fuels has significantly influenced earth's climate, setting in motion inevitable changes that threaten our very existence.

This is, in fact, the reason we began this project in the first place. The implications of our reliance on fossil fuels having been revealed to us, we are now forced to extend our research into mitigating the problem as well as adapting to the changes in our climate that are difficult to measure, but bound to impact us. We must now research new methods of producing energy that are both sustainable and clean.

In order to understand the implications of discoveries and share research into their applications, information must be made readily available in a forum that facilitates open discussion among the scientific community.

Design Strategies

Create an authoritative, centralized global resource that links discoveries with their implications and applications

Solution Elements

 Scientific Applications Resource

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Eric Niu

Contributors

Sources

2006. Global Clean Energy Investment Overview. London: New Energy Finance Limited.

Associated Functions

- Survey coastal areas in detail
- Observe human behaviors in at-risk areas
- Determine impacts of human actions
- Conduct scientific studies
- Extend research based on findings

Observation

For various reasons, resources may not be available for conducting necessary research.

Extension

According to a paper published by the Clinton Global Initiative, investment worldwide in research on renewable energy sources is expected to rise 25-30% per annum. However, they identify ten key areas where actions can promote further investment in research and adoption. The actions most relevant to research include addressing policy weaknesses, accelerate incubation of new technologies, improve the economic environment for investment, and develop mechanisms to support pilot projects.

In essence, in order to provide research initiatives with the resources and funding they need to advance, a proper environment of policies and incentives for capital holders to participate must be implemented. Because commitment to the common good is not enough to support businesses, these policies typically affect the financial incentives for participation.

By extension, the paper mentions a number of strategies for fostering investment in adoption and implementation.

Design Strategies

Provide financial and policy environment that fosters investment in scientific research

Provide incentive for those owning resources to share them (through financial or esteem or other means).

Discover localized, empirical data to incorporate into global research and prediction.

Solution Elements

S Scientific Research Promotion Policies

E Clinton Global Initiative

M Global Scientific Data Repository

Design Factor

Research not applicable to rising seas adaptation

27

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Eric Niu

Contributors

Sources

Van Putten, A.B. and Macmillan, I.C. 2004. Making Real Options Really Work. *Harvard Business Review* 82 (12): 134-141.

Associated Functions

Conduct scientific studies

Conceive potential applications of discoveries

Observation

Research and scientific studies are often not directly related to the specific issue in question. Sometimes, however, the research could apply to other topics or research in other areas could be applicable to the challenges of rising sea levels.

Extension

Research findings do not always reveal information that is directly related to what was originally sought. Companies often encounter this issue when R&D discovers valuable insights that are not directly related to the company's core competencies. In this type of situation, such findings are often marked for sale or licensing in order to still provide revenue for the company.

In a similar vein, research that discovers learnings unrelated to the specific issue it is investigating should have a streamlined mechanism for sharing that information with others who are directly involved in implementing those learnings.

Design Strategies

Provide centralized global resource for sharing information and research among fields

Solution Elements

 Multi-field Scientific Data Repository

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Monitoring

Originator

Eric Niu

Contributors

Sources

Peer review - Wikipedia. http://en.wikipedia.org/wiki/Peer_review (accessed Oct 17, 2006).

Skolnick, Andrew A. 1991. The Maharishi Caper: Or How to Hoodwink Top Medical Journals. *ScienceWriters: The Newsletter of the National Association of Science Writers*.

Associated Functions

Identify discrepancies

Observation

Information presented in various publications will inevitably conflict with each other. Often, it can be difficult to decide upon and verify the prevailing theory.

Extension

The current peer review system is a method by which scientific discoveries are checked by experts in their respective fields before publication. Publications and awards without a peer review system in place are often considered spurious, and the system is designed to ensure rigor and discipline in published papers.

The challenge lies in both finding consensus among theories and verifying that those theories are reasonably accurate. A prime example of uncertainty lies in the medical field where prevailing theories and concepts are routinely overturned by new research and evidence. One of the major complaints about peer review journals is that the process takes months to accept relevant papers. Other challenges arise from the possible tendency of 'mainstream' theories to overshadow revolutionary concepts. As well, the system is not designed to detect fraudulent claims.

While not a perfect solution for discerning what should be the current prevailing theory, the peer review system stands as a rigorous and imperfect method of revealing the most accepted theories.

Design Strategies

A fraud-resistant, impartial system for discerning the most 'correct' theories currently preferred.

Solution Elements

M Open Knowledge Forum

Design Factor

New content not integrated in timely manner

29

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Educating Public

Originator

Eric Niu

Contributors

Sources

Team Deliberations

Associated Functions

Produce media content

Observation

With changes imminent, it is even more critical that information is quickly confirmed and conveyed to the public. Large shifts in the prevailing theories are often handled inappropriately.

Extension

Historically, mainstream media has been slow to promulgate changes in public opinion and understanding. Where news centers are quick to leap on hot new developments, sustained changes in public awareness are rare. In the current debate on climate change, where the vast majority of scientists agree that humans have had significant impact on earth's climate, mainstream media stations in the US have been slow to communicate this in a decisive manner. A procedure to handle such changes and introduce a sustained shift in the opinion broadcast through media channels.

Design Strategies

A system of quickly confirming and distributing pertinent information to the general public.

A systematic method of transitioning public knowledge once necessary changes in prevailing information have been identified.

Solution Elements

S Prediction Confirmation Metrics

S Public Message Transition Practices

Design Factor

Limited access to disaster information records

30

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Monitoring

Originator

Eric Niu

Contributors

Sources

Hurricane Research Intercept Team. <http://www.hurricane-track.com/hirt.html> (accessed Nov 26, 2006).

Associated Functions

Identify discrepancies
Document extreme weather events

Observation

With insufficient information available or restricted information access, documentation becomes more difficult to maintain and sometimes remains incomplete.

Extension

In order to better understand, track, and anticipate disaster events, data must be captured, retained, and made accessible to scientists looking to analyze the information. In addition, active enthusiasts should be empowered to contribute data to the network. Currently, in the US, the Hurricane Research Intercept Team chases storms that make landfall. Such information, made readily available to scientists and decision makers, would help confirm the accuracy of weather models as well as inform disaster planning teams.

Design Strategies

Task forces should be formed to track and measure extreme weather events using standardized metrics.

A central global resource center should record and maintain documentation on extreme weather events.

Solution Elements

E Hurricane Intercept Research Team

S International Hurricane Center

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Terraforming soft barriers

Originator

Eric Niu

Contributors

Sources

Boogert, Neeltje J.; Paterson, David M.; Laland, Kevin N. "The Implications of Niche Construction and Ecosystem Engineering for Conservation Biology." *BioScience* Vol. 56 No. 7 (2006): 570-78.

Associated Functions

Install and grow coastal ecosystems

Observation

Organisms traditionally face difficulties in attempting to adapt to changes in their environment. Many lack the plasticity necessary to flourish in ecosystems lacking the subtle niche conditions they have evolved into.

Extension

Rather than being dependent on keystone species, as is commonly believed, the preservation and expansion of ecosystems is more directly related to the functions of ecosystem engineers. These organisms have subtle effects on more conditions related to species survival than merely the food supply system. They affect general resource flows, and thus those species that utilize those flows.

Because they affect resource flows, the value to other organisms lies in the environmental effects they create. This is validated by the benign invasion of replacement species when an ecosystem engineer vacates an area. Scientists have discovered that such benign replacements have little negative impact upon regional ecosystems.

In essence, these studies show that it may be possible to artificially replicate the environmental effects of ecological engineers to create new niche habitats for transplanted organisms. With further study, it may be possible to engineer new habitats that are both benign for the existing ecosystem and welcoming to species being introduced. This strategy provides support for both resident and transplanted species while obviating the need to wait for slow, evolutionary adaptations in the species.

Design Strategies

Introduce benign ecosystem engineers to new environments.

Understand and cater to the environmental needs of both resident and transplanted species.

Reproduce effects of ecosystem engineer organisms in endangered environments.

Solution Elements

S Society for the Study of Ecosystem Engineers

S EcoCorps.

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Collaborating

Originator

Eric Niu

Contributors

Sources

Kelly, C. et al. 2005. Disaster Relief: Improving Response and Long-Term Recovery. <http://www.boozallen.com> (accessed Oct 17, 2006).

Associated Functions

Solicit funds/resources

Observation

Efforts to effectively distribute helpful resources and funds are often hampered by poor coordination, insensitivity to local concerns, and misunderstanding of community needs.

Extension

When a disaster strikes, many organizations offer help and pledge aid to affected places. Unfortunately, obstacles prevent the effective distribution of aid. For example, there was a tremendous outpouring of support following the December 26, 2004 earthquake and tsunami disaster. Of the \$6.7 billion in aid pledged to victims, only \$2.5 billion had been disbursed as of July, 2005.

This tragedy highlights the challenges of coordinating the distribution of disaster relief efforts. Lacking proper coordination among governments, NGOs, and donors, channels of distribution are overwhelmed by the volume and variety of donations given.

The most obvious disconnect comes from the differences among institutional cultures. According to the findings of a workshop hosted by Booz Allen, relief distribution is dependent on the efforts of three interdependent stakeholders: NGOs, businesses, and governments. A key challenge is sensitivity to the cultural and economic situations of communities in need. These challenges can best be overcome by letting local governments lead the coordination among entities offering relief.

Design Strategies

Establish more effective methods of coordination among international organizations, businesses and donors, and local governments.

Maintain an effective and regular dialogue among key stakeholders.

Identify commonalities among the needs of various local communities.

Incorporate distribution programs into local infrastructure.

Solution Elements

M Coordinated Distribution Channels

S Friends of At-Risk Nations Summit

S Multi-channel Adaptive Distribution Systems

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Collaborating

Originator

Eric Niu

Contributors

Sources

Lynas, Mark. *High Tide: The Truth About Our Climate Crisis*. New York: Picador, 2004.

Flannery, Tim. *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth*. New York: Atlantic Monthly Press, 2005.

Associated Functions

Form relationships with governments

Form relationships with private companies

Form relationships with NGOs

Observation

Entities, by nature, are concerned with the interests of their constituents. In some cases, those interests are not directly affected by rising seas, though there may be numerous indirect effects.

Extension

When small island nations are threatened by rising ocean levels, they have little leverage with which to negotiate for aid from wealthier nations. This is partly because many nations do not face imminent direct impacts due to rising sea levels. Their interests, instead, are typically focused on economic growth. There are two readily apparent strategies for increasing awareness and soliciting aid.

The first strategy is to identify how rising sea levels will ultimately impact all nations, whether directly or indirectly. This can include increasing acuteness of disaster events, economic ramifications, and acceptance of environmental refugees. By no means an exhaustive list, these issues will eventually affect all members of the global community.

The second strategy is to bring the voices of at-risk nations together to collaborate on initiatives, share information and practices, speak with a unified voice, solicit aid, etc. A collective encompasses a larger population, and all potential environmental refugees must have their needs understood and their voices heard.

Design Strategies

Create a bi-directional flow of data and findings between community-based organizations (CBOs) and the scientific community.

An alliance that provides at-risk nations and communities the ability to negotiate with a more powerful voice in the global community.

Solution Elements

S Data Localization Resource

S Alliance of Nations and Communities at Risk (ANCAR)

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Collaborating

Originator

Eric Niu

Contributors

Sources

Rojas Blanco, A.V. 2006. Local initiatives and adaptation to climate change. *Disasters* 30(1): 140-147.

Associated Functions

Form relationships with governments
 Form relationships with private companies
 Form relationships with NGOs
 Inform decision makers

Observation

There is no established protocol for the scientific community to share information with relevant organizations and decision makers.

Extension

While climatic events unfold on a global scale, adaptations and initiatives must be implemented by local organizations. This typically includes both community-based organizations (CBOs) and non-governmental organizations (NGOs). However, without access to the proper scientific information, these organizations are ill-equipped to plan for the pending impacts of climate change. Unfortunately, most scientific information is presented in formats and languages that the average person cannot decipher.

Conversely, the scientific community must recognize the value provided by localized, empirical data when analyzing climatic systems and predicting future trends. This input can be extremely valuable when planning strategies and advising policy.

Already, local and international governments recognize the need for coordination among all levels and entities of government. Such dialogue is key to developing comprehensive growth strategies and designing adaptive solutions.

Design Strategies

An impartial, checked publication that reviews scientific journals and publishes accessible summaries of findings and their implications relevant to decision making.

A publication or database of adaptive case studies that highlight the application of locally implemented initiatives and their ultimate implications and impacts.

Solution Elements

M Intergovernmental Science Journal

S Initiatives Today

Design Factor

No means to identify all relocating individuals

35

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Retreat

Activity

Relocating

Originator

Eric Niu

Contributors

Sources

Team Deliberations

Associated Functions

Establish prioritized sequence of refugee groups

Observation

In population transfers, certain groups of support staff and infrastructure builders must pave the way and establish the new location before the general public can begin relocating. It is impossible to account for every individual if some segments of the population are resistant to relocation. In addition, it is impossible for communities to maintain a complete census of the population in order to ensure that all members are transported.

Extension

Relocating is extremely difficult to accomplish for large populations. Outside of the political and social implications, the logistics of arranging the move are challenging to work out. Identifying, tracking, and moving all members is hampered by reluctance and awareness among other factors.

Awareness can be spread through active initiatives. Such initiatives can be used to help in identifying members of a population prior to moving so that all can be accounted for during the actual relocation. Incentives for participation can include such initiatives as community participation. Constituents who feel empowered to contribute towards community decisions are more likely to participate in those initiatives, even if such choices go against their preferences. Only by helping communities act as a cohesive whole and providing them with the tools to help with relocation can their move be made as painless as possible.

Design Strategies

Actively seek out and register community members for relocation.

Effective means of ensuring that all community members are tracked and accounted for before, during, and after relocation.

Establish faith in decision making bodies by building a consistent record of effective and well thought-out programs.

Solution Elements

S Relocation Awareness Initiative

S ReLocatôr

S Effective Leadership Agenda and Process

Design Factor

Unable to provide adequate resources

36

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Retreat

Activity

Relocating

Originator

Eric Niu

Contributors

Sources

Hearings & Testimony. <http://appropriations.senate.gov/hearings/record.cfm?id=223530> (accessed Oct 20, 2006).

Associated Functions

Move support service personnel

Observation

When moving to undeveloped locations, the logistical means of providing resources has not been firmly established yet, posing challenges to resource provisioning.

Extension

The United States Department of Agriculture's - Natural Resource Conservation Service worked hard to assess relocation sites for the community living in Shishmaref, Alaska. It is important for the people of Shishmaref to maintain their subsistence lifestyle, so care must be taken in the establishment of infrastructure at the new location chosen, Tin Creek.

In their testimony on June 30, 2004 to the United States Senate Committee on Appropriations, Shishmaref Erosion and Relocation Coalition identify a clinic, a tank farm, water and sewage systems, a school, and a warehouse for emergency supplies as the infrastructure systems they need installed at their new home. It is also noted that all construction should be moveable. Unfortunately, support for constructing these systems appears to have vanished. However, these structures are meant to support and house an advance team preparing the new location for the transfer of the remaining population.

Design Strategies

Adaptive resource mobilization systems

Mobile command centers and temporary support structures

Modular infrastructure construction tools

Solution Elements

S Agile Resource Delivery System

E Forward Command Compound

M Modular Construction Tools

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Retreat

Activity

Negotiating accommodations

Originator

Eric Niu

Contributors

Sources

U.S. Senate Committee on Appropriations. <http://appropriations.senate.gov/hearings/record.cfm?id=223530> (accessed on Oct 20, 2006).

Kolbert, Elizabeth. *Field Notes from a Catastrophe: Man, Nature, and Climate Change*. New York: Bloomsbury Publishing, 2006.

Flannery, Tim. *The Weather Makers: How Man Is Changing the Climate and What It Means for Life On Earth*. New York: Atlantic Monthly Press, 2005.

Associated Functions

Accomodate governmental infrastructures from lost nations to host nations

Observation

In relocating peoples, the main concern is historically only the preservation of life. Little consideration is given to issues such as government, economy, culture, etc.

Extension

Potentially the first sovereignty to lose its land to rising sea levels, the residents of Shishmaref, Alaska are preparing to relocate their entire population. Most of the Inupiat residents still survive by subsistence hunting, but the warming ocean waters have made travel on the ice much more dangerous.

With severe storms having already destroyed several houses, the people of Shishmaref have voted to relocate to the mainland. In order for any infrastructure to be built, significant institutional barriers must be overcome. These steps are important, but no government agency has yet taken ownership of initiating action.

While the U.S. Army Corps of Engineers has surveyed for possible sites, the locations under consideration do not fully support the refugees' traditional way of life. With basic services at a new location still missing, it is hard to imagine measures being taken by assisting bodies to preserve their cultural heritage and economic systems.

Design Strategies

Require full and appropriate transplant of culture, economy and government systems in all population relocations.

Remove bureaucratic obstacles to appealing for and receiving assistance with relocation.

A systematic, adaptable, repeatable program for identifying needs, surveying locations, constructing infrastructure, developing economic support, preserving culture, transplanting governmental organizations and

Solution Elements

S Endangered Peoples Relocation Assistance Act

S TransCorps

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Assimilation

Activity

Creating adapted structures

Originator

Eric Niu

Contributors

Sources

Offshore Construction. http://en.wikipedia.org/wiki/Offshore_construction (accessed Oct 20, 2006).

Associated Functions

- Test structures' resilience
- Build land-free structures
- Establish connections among structures

Observation

Because of its extremely fluid behavior, construction projects in or on water become extremely challenging. Maintaining stability, generating heat, applying adhesives, and hardening substances are all challenges made more difficult by water's fluid nature.

Extension

Offshore construction tends to be done in a modular fashion to reduce the time necessary to build in dangerous locales. Modules are constructed on shore and transported to their final destination to be linked together. Typically, construction takes place during windows of relatively calm weather to minimize dangers. Currently, the largest offshore construction jobs involve oil drilling platforms.

Improved methods and systems are needed to improve safety when constructing structures on the water. As well, new technologies, such as concrete that hardens under water, can be applied to offshore construction. And nanotechnology can help improve both desalination techniques, underwater adhesives, and material resistance to saltwater corrosion.

Design Strategies

Construct major structural components at land-based installations (marine yards).

Develop new substances, materials, and procedures for building in and on water.

Engineer or discover corrosion- and salt-resistant construction technologies

Solution Elements

- M** Offshore Construction Methods
- M** Modular Construction Tools
- M** Aquatic Construction Technology Initiative

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accomodation

Activity

Preserving ecosystems

Originator

Eric Niu

Contributors

Sources

Hearings & Testimony. <http://appropriations.senate.gov/hearings/topics.cfm?code=hearings> (accessed Nov 26, 2006).

Associated Functions

- Regulate construction in sensitive ecological areas
- Prevent damage from human visitation
- Maintain ecosystem services to human health

Observation

Political and bureaucratic requirements often inhibit quick and decisive actions that may be necessary in order to preserve ecosystems. Decision making bodies often conduct long and detailed studies that (sometimes deliberately) slow down the process of implementing actions.

Extension

Congressional hearings where subject matter experts and witnesses are invited to testify are typically how decision makers are informed on the potential implications of their decisions. In the case of Alaskan villages under threat from rising sea levels, Congress heard testimony in June 2004 from village councils, district Representatives, engineers from the US Army Corps of Engineers, and company presidents among others. These two days of testimony are meant to inform decisions, but the process of implementation is extremely slow. In the two years prior, some support had dissolved.

A more agile system would allow for more efficient and effective decision making, especially when the timeline for facing challenges is extremely short. In the case of Shishmaref, their way of life is under immediate threat, but there has been little news about progress since the 2004 hearings.

Design Strategies

A process to quickly identify situations where a immediate, decisive response is needed.

A streamlined process and set of requirements governing requests for aid.

Teams of trusted experts whos knowledge in specific areas can help to quickly ascertain an approach to a problem based on potentially limited information.

Solution Elements

M Aid Solicitation and Approval Guidelines

S Science Squads

Design Factor

No way to find/prioritize victims for medical care

40

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster : Response

Activity

Sustaining

Originator

Eric Niu

Contributors

Sources

2004 Indian Ocean Earthquake.
http://en.wikipedia.org/wiki/2004_Indian_Ocean_earthquake (accessed Nov 26, 2006).

Associated Functions

Provide medical care

Observation

In response to disaster events, a key difficulty lies in finding victims and assessing their relative health situations. Many lives are lost when trapped victims are located too long after the disaster event has passed.

Extension

Currently, after a disaster, many people remain unaccounted for. Following the 2004 Indian Ocean Tsunami, approximately 45,000 people were missing. After five days, survival is highly unlikely. Better scanning, tracking, and monitoring systems can help identify and locate victims in a more timely manner, gauge their conditions, and facilitate their extraction and transport to healthcare facilities. Some technologies already exist to accomplish these tasks in a limited fashion, including personal GPS devices and heat scanners, but more advanced technologies would enable rescue workers to save more lives.

Design Strategies

Life-detecting and locating system

Personal GPS devices

Implanted condition-monitoring device

Solution Elements

S Life Scanner

E GPS-Enabled Cell Phone

S Life Monitor

Design Factor

Lack of knowledge/experience with aquaculture

41

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accomodation

Activity

Adapting food and water supply

Originator

Eric Niu

Contributors

Sources

Podrazik, M. et al. Aquatecture:
Floating Fields. 1987.

Associated Functions

Identify new sources of food

Observation

While humans are very capable and knowledgeable about growing and harvesting crops on land, their knowledge about farming trophic, sea-bound plant life remains quite limited.

Extension

Aquaculture and mariculture have already been established as successful methods of producing foods. Potential sources of food include plankton, kelp, and mollusks. Further advantage can be taken from newly engineered crops. Given the proper infrastructure, these techniques can be scaled to produce the food to sustain entire populations.

Research teams dedicated to the task of finding and creating new food sources should explore salt resistant crops, sea-bound food supplies, and the natural ecosystems already found in oceans among others. Sea-bound food production provides an opportunity to free up land that would otherwise be used for farming, reducing the strain on land-bound ecosystems.

Design Strategies

Research adaptable land-based and fresh-water crops that might flourish in sea-bound conditions

Engineer promising crops to flourish in sea-bound conditions

Explore aquatic ecosystems to discover and research aquatic flora suitable for scalable farming and consumption

Solution Elements

S Oceanic Farming Initiative

S Aquaculture Research Team

Design Factor

Applications of discoveries cost more than benefits gained

XX

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Elisabeth Martinez De Morentin

Contributors

Eric Niu

Sources

www.accenture.com
Global research

"Value Discovery: A Better Way to Prioritize IT Investments"

Associated Functions

Extend research based on fundings
Concive potential applications of discoveries

Observation

Most of the time there is not a centralize system to monitor and balance the cost of discoveries versus the benefits of the discoveries implementation.

With all the bureaucracy involved, Coordinating the information and extend a research based on previous findings is difficult.

Extension

The current debate over IT spending often misses the point. It's not how much you spend, it's the way you manage your IT spending that counts. The goal is not reduced spending but selective, value-creating spending that makes a greater contribution to the bottom line.

Value Discovery

IT can play an essential role in helping to build such assets. In the pharmaceuticals industry, for example, IT spending goes disproportionately to manufacturing, which accounts for a far lower percentage of added value (and margin) than research and development. IT spending to support manufacturing efficiency remains vulnerable to such competitive factors as the wholesale shift of facilities to less costly labor markets. From a potential earnings-per-share perspective, a decision to focus discretionary IT spending on R&D-related processes—improved clinical testing, faster government-approval processes, streamlined internal R&D project-approval processes—would create more impact and cause far less exposure to erosion over time.

By Gary A. Curtis, Richard M. Melnicoff and Tor Mesoy

Outlook Journal, October 2003

Design Strategies

Prior to provide funds to a research lab, evaluate the applications. _____

Develop a centralize source for coordinate cost versus implementations benefits. _____

Bring skilled planners in. _____

Solution Elements

M Application ValuMetrics

S Open centralize policy

M Leader

Design Factor

Barriers are not constructed to specifications

43

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Erecting Hard Barriers

Originator

Elisabeth Martinez De Morentin

Contributors

Kristy Scovel

Sources

www.access-board.gov
The Architectural Barriers Act
(ABA) of 1968

Associated Functions

Construct adaptable system of hard defensive structures.

Observation

Major consequences are link when the main construction base it's not build following the standard requirements.

There are not enough technical workers on the construction site. Unexpected terrain changes makes the building process not accurate to specifications and brings the need of updated machinery.

Extension

Adapt existing construction governmental platforms to a new existing location needs.

Architectural Barriers Act of 1968, as amended
42 U.S.C. §§ 4151 et seq

Federal agencies are responsible for ensuring compliance with UFAS when funding the design, construction, alteration, or leasing of facilities. Some departments have, as a matter of policy, also required compliance with the ADA Accessibility Guidelines (which otherwise do not apply to the Federal sector) in addition to UFAS. The Board was created to enforce the ABA, which it does through the investigation of complaints. (The Board was established under section 502 of the Rehabilitation Act). Anyone concerned about the accessibility of a facility that may have received Federal funds can easily file a complaint with the Board. Visit our Enforcement section for further information.

Design Strategies

Bring technical workers in.

Analyze terrain status previous to customize construction documents.

Solution Elements

M Expert Engineers

S Coastal Terrain Data Monitoring

S High Tech Construction Machinery

Design Factor

New concepts may jeopardize natural ecosystem

44

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation:Assimilation

Activity

Creating adapted structures

Originator

Elisabeth Martinez De Morentin

Contributors

Kristy Scovel
Natrina Toyong

Sources

Ecosystems And Human Well-Being.
Millennium Ecosystem assessment
World Health Organization 2005

Associated Functions

Envision new concepts for land-free structures.

Observation

Relocation structures to a land-free on a fast past, is con current to nature evolution. Ecosystems are going to be damage and altered.

Extension

Ecosystems are the planet's life-support systems for the human species and all other forms of live. Human biology has a fundamental need for food, water, clean air, shelter relative climatic constancy. Other health benefits include those derived from having a full complement of species, intact watersheds, climate regulations and genetic diversity. Stresses on freshwater sources, food-producing, infrastructures, system and climate regulations can conduct unpleasant surprises, such as emergence and spread of new infectious diseases.

Design Strategies

Prior to relocation, develop a system to avoid ecosystem alteration at the new location

Study ecosystem weakness and provide appropriate aids to prevent health problems.

From ecosystem changes, can emerge and spread new infectious diseases.

Solution Elements

M Instrumental

S Planning Aid program

S Vaccines

Design Factor

The appropriate talent pool is not available to engineer structures.

45

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Assimilation

Activity

Creating adapted structures

Originator

Elisabeth Martinez De Morentin

Contributors

Kristy Scovel
Natrina Toyong

Sources

U.S. Merchant Marine Academy

Associated Functions

Envision new concepts for land-free structures

Observation

There are not enough technical workers on the construction site. Unexpected terrain changes makes the building process not accurate to specifications and brings the need of engineers on the field.

Extension

Marine Engineering Systems Program

The Marine Engineering Systems program prepares midshipmen to serve as licensed officers in the U.S. Merchant Marine; provides an engineering education that prepares them for a wide variety of professional positions in such career fields as ship systems and marine equipment design, research, construction, operations, marketing, maintenance, repair and survey; and imparts to them an engineering education that permits them to pursue graduate study and/or to become licensed as a Professional Engineer, should they so choose. This program focuses on the design of marine power plants and their associated systems.

Design Strategies

Bring technical workers in.

Solution Elements

M Engineers

E Army Corps of Engineers

Analyze terrain status previous to customize construction documents.

S Data control

Design Factor

Current logistic systems do not cater for the new environment.

46

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Assimilation

Activity

Establishing New infrastructure

Originator

Elisabeth Martinez De Morentin

Contributors

Natrina Toyong

Sources

US Military Logistics (RML)

Associated Functions

Implement new sources for raw materials

Observation

Most of the time standards logistics systems and not address the needs of new environments.

With all the bureaucracy involved, between nations it is difficult to coordinate and determinate the needs.

Extension

One of the key tenets of the Revolution in Military Logistics (RML) is an enterprise-wide seamless logistics system. This concept envisions integrating the Army's logistics management framework, command and communications processes, and automation architecture into one seamlessly accessible system that will be transparent on one end to the user and on the other end to the supplier. Such a system underpins much of what we characterize as revolutionary in the future of military logistics, because it will leverage the best commercial business processes, infrastructure designs, and global information and electronic commerce technologies.

· Seamless: Integrated, single, collaborative, transparent, unbroken, and without boundaries.

· Logistics: All activities that facilitate military operations, including design and development, acquisition, storage, distribution, maintenance, and disposition of materiel; movement and evacuation and hospitalization of personnel; acquisition or construction, maintenance, operation, and disposition of facilities; and acquisition or furnishing of services.

Design Strategies

Provide logistics facilities.

M Floating Road

M Sea Tunnel

Develop a centralize source for coordinate desitions and

S Open centralize policy

Solution Elements

Design Factor

Conflicts poorly handled

47

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation:Assimilation

Activity

Adjusting to new lifestyle

Originator

Elisabeth Martinez De Morentin

Contributors

Eric Niu

Sources

ARIZONA STATE
UNIVERSITY DEPARTMENT
OF ANTHROPOLOGY

Associated Functions

Mitigate potential new sources of conflict.

Observation

The adaptation to a new environment/area is difficult, creating psychological issues for the cultural barriers and physical issues for the new terrain. There is not an establish protocol for the community to address does issues with relevant organizations and decisions makers.

Extension

The circumstances provoking cultural shock and the individual reactions depend on a variety of factors, including previous experience with other cultures and cross-cultural adaptation; the degree of difference in one's own and the host culture; the degree of preparation; social support networks; and individual psychological characteristics (Furnham & Bochner, 1986). The multivariate nature of cultural shock requires the development of "programmes of preparation, orientation and the acquisition of culturally appropriate social skills" (Furnham & Bochner, 1986, p. 13). My experience with programs for helping people manage cultural shock experiences comes primarily from my role as director of the Arizona State University Ethnographic Field School in Ensenada, Baja California, Mexico. These experiences have shown me that helping students manage their cultural shock experiences is fundamental to their success.

Design Strategies

Create a legislation structure

Educate communities about the issues

Bring specialize physicians to assist the people.

Solution Elements

M Leader

S Open information policy

S Psychology experts

S Physical experts

Design Factor

Considerable costs in planning and restructuring of land use

48

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accomodation

Activity

Adapting food and water supply

Originator

Elisabeth Martinez De Morentin

Contributors

Gabriel Biller

Sources

NRCS
United States Department of
Agriculture

Associated Functions

Identify new souces of food

Observation

The new land planning structuring application needs and the need of information to Identify new sources of food, is difficult and costly.

Extension

Planning is necessary for attractive and productive wildlife habitat. You have both a horizontal area to work with -- the size of your lot -- as well as a vertical area that stretches from your soil to the treetops. The vertical area is composed of the canopy formed by the tallest tree branches; understory vegetation consisting of smaller trees, shrubs, and vines; the floor which is often dominated by low-growing groundcovers; and the basement where a variety of organisms exist in the soil. Different wildlife species live in each of these zones, so numerous habitats can be provided on a small piece of land

Design Strategies

Identify new sources with limit information at low cost

Develop a centralize source to coordinate research cost

Bring skilled planners in.

Solution Elements

M Science Squads

S Open centralize policy

S Leaders

Design Factor

cultural barriers

49

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accommodation

Activity

Preserving Ecosystem

Originator

Elisabeth Martinez De Morentin

Contributors

Sources

Department of Society and Conservation. The University of Montana.

Associated Functions

Regulate construction in sensitive ecological areas

Prevent damage from human visitation

Maintain ecosystem services to human health

Observation

Active participation and massification of people plus infrastructures to a develop or undeveloped landscape creates ecosystems imbalance and lost of biological diversity.

Extension

Bachelor of Science in Recreation Management.

This curriculum begins with courses about the basic ecological character of recreation lands, recreation resources and the characteristics, needs, activities and behavior of recreation visitors. Then, there are two specializations in the recreation management program : an option in recreation resources management and an option in nature-based tourism.

Design Strategies

To prevent disease

Develop a centralize source for coordinate and monitor visitors.

Solution Elements

S "Mother Nature is your doctor"

S Open information policy

Design Factor

Surrounding area has been destroyed

50

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Erecting Hard Barriers

Originator

Elisabeth Martinez De Morentin

Contributors

Kristy Scovel

Sources

World resources Institute
Earth Trends
- Environmental information -

Associated Functions

Asses potential impacts to coastal ecosystems

Observation

Destroyed coastal surrounding areas creates one of the major impacts to the ecosystems.

Extension

The sandy beaches, rocky shorelines, water, and waves of coastal areas are perhaps most readily associated with recreation and natural beauty. Coastal ecosystems, however, have an economic value beyond their aesthetic benefit, supporting human lives and livelihoods through the provision of food and materials, nutrient cycling, waste processing, and other essential goods and services.

Design Strategies

To evaluate damage.

Team to execute ecosystem engineers

Solution Elements

S Coastal Tarrain Data Monitoring

S EcoCorps

Design Factor

There is no funding available for upgrading structures

51

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Erecting Hard Barriers

Originator

Elisabeth Martinez De Morentin

Contributors

Kristy Scovel

Sources

FEMA

Associated Functions

Maintain and upgrade defensive structures

Observation

Demand dramatically of upgrading structures, relates directly to a lack of finding.

Extension

FOREWORD

California is one of the most seismically active States in the U.S. The statistics generated by seismologists are sobering. Over the coming decades variously sized earthquakes can be expected throughout the State, some with catastrophic damage potential. A sample statistic: there is a 90% probability that either the San Francisco Bay Area or the Los Angeles basin will suffer a magnitude 7 or larger earthquake by the year 2020.

Each of the many large earthquakes predicted throughout the State can cause billions of dollars in property damage, loss of human life, injury, and disruptions in transportation, communications and utilities.

As one response to this threat, because unreinforced masonry buildings (URMs) are susceptible to serious damage in a major earthquake, in 1986 the State of California adopted what is commonly referred to as "the URM Law." As discussed later in this Handbook, this law requires municipalities and counties within the most seismically active zones in the State to identify and create hazard mitigation programs for the unreinforced masonry buildings in their jurisdiction. A number of earthquake experts are now recommending that such identification and mitigation be applied to other seismically hazardous structures as well, including concrete frame structures lacking ductile connections, poorly designed tilt-up concrete buildings with inadequate roof-wall connections, and older (pre-1960) homes with inadequate strength in their foundations or cripple walls.

Design Strategies

Prior to ask for funds, evaluate the applications. —

M Evaluation metrics

Develop a centralize source for coordinate cost versus implementations benefits. —

S Open centralize policy

Bring skilled planners in. —

S Leaders

Solution Elements

Design Factor

Lack of funds to upgrade old structure

52

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accommodation

Activity

Modifying structures and systems

Originator

Elisabeth Martinez De Morentin

Contributors

Albert Wang

Sources

FEMA

Associated Functions

Evaluate adaptation options

Observation

With imminent changes, it is critical to eliminate old structure under bad conditions, and set new basic spec for new structure, abandon the low-value structure. To collect public awareness is a key component to recollect funding, private or public (government).

Extension

A GUIDE TO THE DISASTER DECLARATION PROCESS AND FEDERAL DISASTER ASSISTANCE

In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§ 5121-5206, was enacted to support State and local governments and their citizens when disasters overwhelm them.

The determination of which programs are activated is based on the needs found during damage assessment and any subsequent information that may be discovered.

Public Assistance, oriented to public entities, can fund the repair, restoration, reconstruction, or replacement of a public facility or infrastructure, which is damaged or destroyed by a disaster.

Design Strategies

Prior to provide requests funds evaluate the real needs.

Develop a centralize source to coordinate funds recollection and logistics.

Solution Elements

M Evaluation metrics

S Open centralize policy

Design Factor

Unpredictable time line of rising level

53

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accommodation

Activity

Modifying Structures and Systems

Originator

Elisabeth Martinez De Morentin

Contributors

Sources

The Chicago River North Branch Watershed. Project (NBWP)

Associated Functions

Anticipate level of rise

Observation

Even using with the most up today advanced technology it is not a 100% precise. To anticipate to any unpredictable scenario it is a real fact that must not be avoid.

Extension

One of the urbane solutions to look a it as a reference is to the Chicago river water front road plan, perfect example to mitigate the water levels.

Chicago River Project

Addressing Urban Problems

At the turn of the last century, the Chicago River Watershed was called "The Everglades of the North." The North Branch of the Chicago River has undergone significant changes since then, including channelization for agriculture and urban drainage. The 96-mile watershed covers parts of two counties, densely populated Cook County and rapidly growing Lake County. The Friends of the Chicago River (Friends) and The Lake County Stormwater Management Commission (SMC) joined forces to address a century of problems affecting the river. This voluntary collaboration has two primary goals. The first is to develop a multi-objective strategy to implement best management practices that address non-point source pollution, flooding, and the protection and restoration of natural resources. The second goal is to educate citizens and community leaders in the planning process and river stewardship.

Design Strategies

Urban architects to redesign the area

Educate community with the new urban plan

Solution Elements

M Topographical instruments

S Urban signage

S Open information

Design Factor

Lack of time

54

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Retreat

Activity

Negotiating accommodations

Originator

Elisabeth Martinez De Morentin

Contributors

Sources

Human Rights Watch. ORG

Associated Functions

Conduct accurate relocation schedule

Observation

The top of the hierarchy of decision makers at the Government and nongovernmental institutions and the difficulty task it's self, it makes to slow down the process.

Extension

Real case: A lot of bureaucracy and politics before to make a decision.

"Since many Afghan refugees and all of the newest arrivals to Pakistan are undocumented, seeking to ensure that assistance and protection are provided to all refugees has been an enormous challenge for UNHCR and NGOs.

Against the backdrop of overcrowded camps and squalor in urban environments, UNHCR and the government of Pakistan agreed on November 7, 2001, that the newest arrivals among the refugee population in both new Jalozai and in urban areas would be relocated to camps located in Pakistan's FATA.¹⁷² The first camp, called Kotkai camp was located in Bajaur Agency.¹⁷³ Government officials and UNHCR soon decided that the camp in Bajaur would only be safe for Pashtun refugees because of security concerns for the other ethnic groups. Therefore, in early December camps were prepared for refugees from the Tajik, Uzbek, and Hazara ethnic groups in Kurram Agency."

Design Strategies

Develop a centralize source to facilitate decision makers on a very an intensive process of negotiations.

Bring skilled planners in.

Solution Elements

S Open centralize policy

S Leaders

Design Factor

Desalination process produces industrial wastes that must be disposed of safely and in environmentally-sound way.

55

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Accommodation

Activity

Adapting food and water supply

Originator

Elisabeth Martinez De Morentin

Contributors

Gabriel Biller

Sources

www.coastal.ca.gov
California Coastal Commission
Seawater Desalination in California

Associated Functions

Implement large-scale desalination

Observation

Devastated ecological consequences are done by the Industrial waste produced by large-scale of desalination process.

Extension

Waste Discharges

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used during defouling of plant equipment and pretreatment, and toxic metals (which are most likely to be present if the discharge water was in contact with metallic materials used in construction of the plant facilities). Liquid wastes may be discharged directly into the ocean, combined with other discharges (e.g., power plant cooling water or sewage treatment plant effluent) before ocean discharge, discharged into a sewer for treatment in a sewage treatment plant, or dried out and disposed of in a landfill. Desalination plants also produce a small amount of solid waste (e.g., spent pretreatment filters and solid particles that are filtered out in the pretreatment process).

For example, the capacity of the City of Santa Barbara's desalination plant is 7,500 AF/yr (about 7.16 MGD). In May 1992, the plant produced 6.7 MGD of product water and generated 8.2 MGD of waste brine with a salinity approximately 1.8 times that of seawater. An additional 1.7 MGD of brine was generated from filter backwash. Assuming that concentrations of suspended solids in the seawater feed range from 10 to 50 ppm, approximately 1.7 to 5.1 cubic yards per day of solids were generated, which is equivalent to one to two truck-loads per week.

Design Strategies

Bring related experts together

S Updated technology

S Data information code

Regulate and create a safety standards policies

S OpenInfo

S Open information policies

Solution Elements

Design Factor

Difficulty bringing together medical workers/supplies and victims

56

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster : Response

Activity

Sustaining

Originator

Elisabeth Martinez De Morentin

Contributors

Gabriel Biller

Sources

www.directrelief.org
www.redcross.org/pressrelease

Associated Functions

Provide medical care
Provide psychological counselig

Observation

Natural disasters, are frequently followed by a non organizer AID response, partially created for the fair and unexpected Psychological factor of human been behavior.

Extension

The Red Cross launched Together We Prepare in February 2003 to help Americans prepare for emerging threats and disasters before they happen. The program challenges Americans to take five proactive steps: (1) make a plan; (2) build a kit; (3) get trained; (4) volunteer; and (5) give blood to help make their families and neighborhoods safer. Together We Prepare - Schools and Together We Prepare -Workplaces highlight and raise awareness on the importance of emergency planning for different environments.

Guide to Business Continuity Planning CD-ROM – offers comprehensive, step-by-step instructions on addressing life safety issues, minimizing interruptions, transitioning back to normal operations, working with public and private agencies and formalizing the disaster plan. “While many businesses have insurance in place to protect against disasters, many fail to remember that most insurance won’t cover the cost of downtime,” Conner points out. “The wildfires, blackout and Hurricane Isabel with their destruction and disruption are reminders of how vulnerable businesses are to disasters.”

Design Strategies

Help people to handle conflicts

S Psychology experts

To localize survivors

S Life Scanner

Provide AID into the field

S Medical Response Vehicles (sea, air and land)

Solution Elements

Design Factor

Instrument and tools lack enough sensitivity

XX

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis

Activity

Researching

Originator

Natrina Toyong

Contributors

Sources

Univeristy of Illinois at Urbana-Champaign, "Insects, viruses could hold key for better human teamwork in disasters", Lynn,A., <http://www.news.uiuc.edu/news/05/0301disasterresearch.html>

Associated Functions

Observe human behaviors in at-risk areas

Observation

Various researches today suggests an array of augmented solutions for observing human behavior during disaster, preference towards trial and error.

Extension

Amongst the proactive effort in the observation scientists are looking to nature – specifically, to ants, bees and viruses – for ways to improve human collaboration during disaster relief efforts.

Post disaster methods suggested currently by University of Illinois At Urbana-Champaign from their natural-world findings fall under three major areas: collaboration among organizations involved in disaster-relief efforts; the use of information technology to support preparedness, response and recovery tasks; and the emerging role of civil engineers as key first responders to disasters.

In the entomology area, the research teams are looking at honeybees' (*Apis mellifera*) collaborative decision-making process when selecting a new hive or foraging, and at ants' (*Solenopsis invicta*) behavior when they are under threat.

Design Strategies

Provide evacuation scheme according to number of people or per family.

Build community-based strategies to implement disaster management

Solution Elements

M Road Trip

M Colony Order

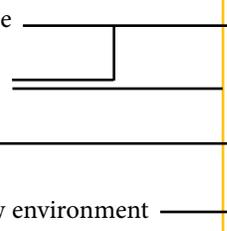
Design Factor

Panic during the disaster

XX

Project Adapting to Climate Change: Rising Seas	Sources World Volunteer Web, "Keeping your volunteers safe during disaster response", Marks, C.S http://www.worldvolunteerweb.org/browse/sectors/emergency-relief/doc/keeping-your-volunteers-safe.html , Sept 25, 2006. "Psychoeducation as a Response to Community", Howard, J.M., Goelitz, A, Disaster http://brief-treatment.oxfordjournals.org/cgi/reprint/4/1/1.pdf	Associated Functions Select appropriate distribution channels
Mode Communicating		
Activity Educating Public		
Originator Natrina Toyong		
Contributors		

Observation Selection of distribution channel should take into consideration that panic might occur during disasters. Communication which includes giving and receiving instructions / directions will be the hardest to deploy in chaotic environment.	Extension While it is uncomfortable for some volunteer managers, it is important to take a commanding attitude during a chaotic situation. Commanding attitude will therein make volunteers more comfortable in the chaotic situation to take charge and make commands themselves. In the guideline provided by World Volunteer Web it is also important to constantly monitor the tasks that volunteers are being asked by responders to perform. Educating responders and volunteers about the volunteers' roles and acceptable volunteer positions can assist in making sure disaster management are handled well. Project Liberty a federally sponsored post-9/11 support program administered by the New York State Office of Mental Health, held Safe Horizon Seminars in an initial effort to establish psychoeducation as a viable means of both providing support and screening for individuals at risk in the aftermath of community disaster. It has, successfully facilitated numerous psychoeducation workshops on topics of interest to this population which include parenting workshops, anger management,
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Design Strategies Offer counseling and assistance Collect database of volunteers Rebuild familiar structure Prepare guide for living in new environment	Solution Elements  <ul style="list-style-type: none"> M Helping Hand E World Volunteer Web S Reminiscence Keeper M Start-up Kit
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Design Factor

Unable to secure necessary manpower

XX

Project Adapting to Climate Change: Rising Seas	Sources Federal Emergency Management Agency, "EMAC Comes To The Rescue During Disaster", https://www.fema.gov/news/newsrelease.fema?id=6637 October 20, 2003 Department of Defence United States of America, "Civilian Personnel Management Guide for Management Officials During Contingencies and Emergencies", http://www.cpms.osd.mil/civ_prep/ManagementGuide.pdf , March 2003	Associated Functions Solicit Fund / Resources
Mode Communication		
Activity Collaborating		
Originator Natrina Toyong		
Contributors		

Observation Effectiveness of disaster management in terms of acquisition of man power and funding can better be approached with strategic partnerships, clear guidelines and garnering cooperation of communities involved.	Extension In the event where a city is in a disaster, operations have gone to a 24-hour/7-day status and there is a lack of experienced emergency management professionals to help handle the extra workload, District of Columbia Emergency Management Agency (DCEMA) has a solution. It used it when faced with this dilemma in Hurricane Isabel's aftermath. DCEMA Director Peter LaPorte immediately called on the Emergency Management Assistance Compact (EMAC), a mutual aid agreement and partnership that offers a quick and easy way for states to send personnel and equipment to help disaster relief efforts in other states and jurisdictions. Department of Defence has provided guidelines that is generally applicable to the Department of defence civilian workforce regardless of duty station geographic location. It is applicable to crisis situations arising in connection with homeland defense as well as to those arising in overseas areas. It applies to nonappropriated fund employees as well as appropriated fund employees.
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Design Strategies Generate sense of ownership over responsibility amongst locals ——— Collect database of volunteers ——— Establish structured and collaborative effort ———	Solution Elements M Responsible Citizen S World Volunteer Web E Emergency Management Agency
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Design Factor

Resources are unavailable

XX

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Erecting Hard Barriers

Originator

Natrina Toyong

Contributors

Sources

Multidisciplinary Center for Earthquake Engineering Research MCEER Highway Project Research", <http://mceer.buffalo.edu/research/HighwayPrj/default.asp>

Southern Illinois University Edwardsville, "Virtual Reality Demonstrations" <http://www.ce.siu.edu/earthquake/>, Sept 2005

Associated Functions

Construct adaptable system of hard defensive structures

Observation

Identifying resources will include studies to find standalone or combination of resources which can withstand rising water and related disasters, enhanced further by new ways of construction and engineering.

Extension

Multidisciplinary Center for Earthquake Engineering Research (MCEER_ is a national center of excellence dedicated to the discovery and development of new knowledge, tools and technologies that equip communities to become more disaster resilient in the face of earthquakes and other extreme events. MCEER accomplishes this through a system of multidisciplinary, multi-hazard research, education and outreach initiatives. Headquartered at the University at Buffalo, The State University of New York, MCEER was originally established by the National Science Foundation (NSF) in 1986, as the first National Center for Earthquake Engineering Research (NCEER). In 1998, it became known as the Multidisciplinary Center for Earthquake Engineering Research (MCEER), from which the current name, MCEER, evolved.

Southern Illinois University is currently doing studies in creating a website containing three-dimensional virtual reality models of buildings to demonstrate structural and nonstructural damage sustained during an earthquake and the effectiveness of earthquake retrofit techniques. Website users will be able to interactively install or remove various earthquake retrofit details and observe the results of the installation or removal of retrofit components during a simulated earthquake.

Design Strategies

Build experimental collapsible and convertible structures with existing resources

Test resources durability using virtual and robotic simulations.

Establish a centre for the discovery and development of new knowledge, tools and technologies for rising sea resource development.

Solution Elements

M Redefined Resource

E Resource Durability Simulator

M Rising-Sea Consortium

Design Factor

Taking earth from existing highland changes area topography

XX

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Protection

Activity

Terraforming soft barriers

Originator

Natrina Toyong

Contributors

Sources

Disappearing beaches: engineering solutions, Dr J Floor Anthoni (2000)
www.seafriends.org.nz/oceano/beacheng.htm

Associated Functions

Extend and develop beach buffer zone

Observation

Beach Buffer may be developed naturally or artificially. Combination of both may be the most sustainable solution.

Extension

Renourishment

When a beach erodes and the sea starts to threaten properties, the first engineering solution is to bring in new sand, also known as renourishing the beach.

Beach Drainage

The sand is able to dry and the sea wind is able to re-create a dry beach. It is a cheap and effective way for beaches whose sand cannot dry easily.

Sea Walls

Where beach erosion appears unstoppable, sea walls are built to protect property, business and life, but the natural beach disappears.

Groynes

Beaches strung between headlands are less prone to erosion from long-shore currents. Groynes (groins) are artificial headlands between which sand accumulates. But they cause problems and look ugly.

Breakwaters

Artificial barriers erected parallel to the shore. Sand gets trapped behind them.

Design Strategies

Extend buffer by creating structure before placing sand

Build web mash to give fiber-like effect for trapping sediments and creating buffer on coastal areas.

Solution Elements

M Beach Architecture

S Web Buffer

Project Adapting to Climate Change: Rising Seas	Sources The Making and Unmaking of Battle Creek's African American, "The Process of Displacement" http://www.memoriesfromhamblin.org/displacement.html	Associated Functions Transplant Communities
Mode Adaptation : Retreat		
Activity Relocating		
Originator Natrina Toyong		
Contributors		

Observation A common occurrence of community relocation is a displacement and the lost of a sense of belonging.	Extension <p>Located at the confluence of the Kalamazoo and Battle Creek Rivers, the Bottoms was a neighborhood of factories, workshops, and working people. Immigrant families settled there early in the 1900s; African Americans moved from the U.S. South between the world wars. However, recurring flood was a major problem in the Bottoms and finally in April 1947, a particularly bad flood struck the area, inundating streets, cars, homes, factories, and warehouses. This led to major relocation period, where some moved but others stayed back but living in dire condition.</p> <p>With the plans to construct flood controls on the Kalamazoo River and to clear what was seen as the substandard housing of the Bottoms, the neighborhood underwent a transformation that permanently changed it. The area residents moved out of the neighborhood or were forced to relocate as planning and construction began on the massive Cement River Project. In the process, the Bottoms went from a close-knit residential area to what it is today.</p> <p>An attempt to salvage what was left of the community is seen through cultural projects and the introduction of the "Memories from Hamblin" website to generate awareness of the once strong community now trying to rebuild its relationship.</p>
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Design Strategies Rebuild familiar structure ————— Prepare guide for living in new environment ——— Offer counseling and assistance —————	Solution Elements M Reminiscence Keeper M Start-up Kit E Helping Hand
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Project Adapting to Climate Change: Rising Seas	Sources US, Senator David Vitter, "Vitter Bill Would Improve FEMA Temporary Housing", http://vitter.senate.gov/?module=PressRoom/PressItem&ID=7fe221b9-5ddd-42e8-a7d2-e78d7cde4aec , May 9, 2006	Associated Functions Build Infrastructure to receive refugees
Mode Adaptation : Retreat		
Activity Relocating		
Originator Natrina Toyong		
Contributors		

Observation Housing should cater for its usage to be extended as evacuees spend their time to search for means to rebuild their lives.	Extension <p>In U.S Senator, David Vitter's website, he highlighted the need to provide for a permanent but modular housing as opposed to providing temporary FEMA travel trailers that cost \$70,000 each. On top of being non-cost effective, the trailers do not provide the most basic protection from high winds or severe thunderstorms, much less tornadoes or hurricanes.</p> <p>In his arguments, Senator Vitter suggests FEMA to use manufactured modular housing, which is much sturdier at the same time less expensive option for taxpayers. On top of that, suggestion were made so that the FEMA Housing Assistance Act to allow resident to use other cost-effective housing options that are less expensive than the FEMA travel trailers.</p> <p>This allows the residents receiving the FEMA housing assistance to opt for less expensive but permanent housing to be built on the land allocated to them.</p>
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Design Strategies Build temporary housing that are convertible to become permanent.	Solution Elements  Evolving Home
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Project
Adapting to Climate Change: Rising Seas

Mode
Adaptation : Retreat

Activity
Relocating

Originator
Natrina Toyong

Contributors

Sources
Rethinking Japanese national identity: Narratives of Japanese intellectuals
by Takeishi, Chikako, Ph.D.,
Harvard University, 1999, 372 pages; AAT 9935912
<http://proquest.umi.com/pqdweb?did=733525701&sid=3&Fmt=2&clientId=2287&RQT=309&VName=PQD>

Associated Functions
Retain Cultural Values

Observation
Living in a new location requires a fresh new start. The everyday norms that shapes the cultural value of a society is disrupted and members are forced to adapt to new environment.

Extension
The everyday activity and decision making that was previously taken for granted has now become an everyday battle to adapt to the new surrounding. The pressing situation becomes a battle between time and settling down to return to the normal mode of everyday life.

A dissertation by Takeishi Chikako, a Havard Phd student, explores the relationship between Japanese intellectuals' conception of national identity and their social background. Citing an example, the author mentioned how Japan became a more active player in international society as a result of what history dictates of them. Three social needs that motivates the formation of nationalism mentioned are status(power, influence, control), community (sense of belonging) and cohesive narative(cognitive order, meaning and consistency). It is by these guideline that Japan reshaped the society's culture at a national scale.

This can be translated into a smaller scale in a particular society to build strong cultural values that are able to withstand even the extreme of social instability.

Design Strategies
Form emergency cultural guide which will be adopted into growth through diligent practice over the years.

Solution Elements

- M Sub Culture
- M Culture Formation Team

Initiate culture formation by bringing representative from different ethnic group affected by the relocation.

Design Factor

Structure do not endure off shore

65

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Assimilation

Activity

Creating Adapted Structure

Originator

Natrina Toyong

Contributors

Sources

Crawford, J.E, "Achieving Resilient Building Design for Protection Against Structural Collapse" Karagozian & Case, USA.

Associated Functions

Test structure resilience
Build land free structure
Build temporary structure

Observation

Structure to endure the sea condition will need to be tested using actual material in actual conditions.

Extension

According to as study on Resilient Building Design, good structure should have its reliance on ductile, plastic behavior and redundant load paths to achieve maximum protection. On top of this, a key feature of high performance protection systems is their consideration of shock related behaviors and its relation to the intensity of load. Finally, a key feature is that the design should not increase the risks. Safer to say, that aesthetic should not be placed of higher order compared to safetey features.

The same study shows what may contribute to a building's decline; Material changes due to fracture, softening, hardening, rate effects and changes in structural frame behavior due to buckling, fracture, or degradation of members and connections, and redistribution of the load.

This factors are further put into scrutiny and extensive research when the building are to withstand surviving in sea water and the material expansion with high and low tide.

Design Strategies

Establish collection existng material to be researched for other usage.

Test material strength in simulated condition

Solution Elements

M Adpoted Matter

M Saving Hierarchy

<p>Project Adapting to Climate Change: Rising Seas</p>	<p>Sources Amphibious Vehicles Plt Ltd, http://www.amphibiousvehicles.com.au/Design.html</p>	<p>Associated Functions Adapt to new modes of transportation</p>
<p>Mode Adaptation : Assimilation</p>		
<p>Activity Adjusting to new lifestyle</p>		
<p>Originator Natrina Toyong</p>		
<p>Contributors</p>		

<p>Observation</p> <p>Transportation that are created for both land and water use are not practical for commercial usage.</p>	<p>Extension</p> <p>An established company producing amphibious vehicle for Australian market mostly caters for the tourist market and rescue recovery applications. These amphibious vehicles have been operating in the calm waters of Australia's tourism capital, the Gold Coast, for more than three years and have an excellent safety record. Built in Queensland, these vehicles are the most advanced of their kind in the world and offer an impressive list of features.</p> <p>Their range of usage however are very limited to these two areas because practicality is still an issue that are not adressed. A factor not contributing postively to its growth is the absence of mass market needs.</p>
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<p>Design Strategies</p> <p>Transport that are able to move on land as well as on water.</p> <p>Public transportation elevated on water surface.</p>	<p>Solution Elements</p> <p>M Amphibious Vehicles</p> <p>M Aqua-Transport</p>
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Design Factor

Building may become isolated in the middle of water

67

Project Adapting to Climate Change: Rising Seas	Sources Tunnelling and Underground Space Technology "Nordic sub sea tunnel projects" http://www.ita-aites.org/cms/fileadmin/filemounts/e-news/doc/ITANews11/TUST_OS_2005_nordic.pdf , 2005	Associated Functions Anticipate level of rise
Mode Adaptation : Acommodation		
Activity Modifying Structures and Systems		
Originator Natrina Toyong		
Contributors		

Observation Underdeveloped transportation access in and out of water structure may be a limiting factor for progression of economic and daily activities.	Extension A good example of underground tunnel project is the Nordic sub sea tunnel projects in Norway. Since the official oppening of the Vardø tunnel in 1983, 23 sub sea road tunnels have been built. These tunnels have successfully replaced many congested ferries on the stem roads and connected island communities to the mainland. This is an achievement of a new era in coastal communication and development. These Sub sea road tunnels enable highly desired improvements of the road network. while reducing the number of ferry connections it also vitalizes local businesses. The great outcome of the project leads to more project for tunnels that are anticipated and greatly welcomed by comunities of the mainland and islands.
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Design Strategies Develop water transportation system	Solution Elements <ul style="list-style-type: none"> M Floating Road M Sea Tunnel
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Design Factor

No means to train farmers and others on new production methods

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Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation : Acomodation

Activity

Adapting Food and Water Supply

Originator

Natrina Toyong

Contributors

Sources

Department of Ecology, Puget Sound Shoreline, " What Estuaries Provide" <http://www.ecy.wa.gov/programs/sea/pugetsound/beaches/estuary.html>

Commonwealth Scientific and Industrial Research Organisation, "Farming systems to address salinity", <http://www.csiro.au/csiro/content/standard/psns.html>

Associated Functions

Identify new sources of food

Observation

Adaptive production method will need to be researched and tested before introduced to famers in a custom tailored implementation plan.

Extension

Currently, adaptive farming technique are being inroduced by researchers. However, the advancement is not happening as fast as hoped due to factors such as cost, time and inability to source willing participants.

In some part of the globe, rising sea has increased the water table of soil resulting in higher salinity. Traditional adaptation method is still able to aid in adaptation of this environment by providing better irrigation technique. Overtime however, the increase in salinity may limit the type of crops that are available for farming and better irrigation technique may not be able to solve the problem as irrigation water source itslef may be of high salinity.

At this stage, not only do farmers require new type of farming technique, they may also require new technology and genetcally modified crops.

Design Strategies

Provide consultancy program for specific food processes

Scientific research on new food production

Solution Elements

S The Food Makers

E Genetically Modified Food

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster : Preparation

Activity

Evacuation

Originator

Natrina Toyong

Contributors

Sources

American Red Cross. <https://disastersafe.redcross.org> (accessed October 16, 2006)

Disaster Relief Improving Response and Long-Term Recovery U.S. Chamber of Commerce. <http://www.uschamber.com/NR/rdonlyres/ed372i47jkc3xon2lg-cymiktqeddqc4dcwy2dp6bj6goq7luw4ddvlyquplhczag-4pe6zet5ktsgcsmmd-hhkzph5wb/July11DisasterSimulationFinalReport.pdf>, July 2005 (accessed October 16, 2006)

Associated Functions

- Identify means of mobilizing evacuees
- Identify evacuees
- Identify disaster team and volunteers
- Gather resources

Observation

Following disaster, telecommunication system may encounter temporary or permanent disruption which may paralyze evacuation process.

In a non-technological sense, communication as a system may fail due to unfamiliar procedures and differences in conduct.

On July 11, 2005, the U.S. Chamber of Commerce Center for Corporate Citizenship (CCC) and Booz Allen Hamilton brought together 70 government, business, and nonprofit leaders to work on a Global Disaster Relief simulation as an exercise in public-private-nonprofit coordination.

Extension

Red Cross lanuched a new web site in preparation for 2006 Hurricane Season, in Washington on July 01, 2006. The Safe and Well Website provides a way for a person to register his/herself as “safe and well.” It provides a list of standard messages that can be communicated to family members around the world. At the same time, The Red Cross is working with several federal and local agencies that provide families with additional options to help with communication during times of emergency

On July 11, 2005, the U.S. Chamber of Commerce Center for Corporate Citizenship (CCC) and Booz Allen Hamilton brought together 70 government, business, and nonprofit leaders to work on a Global Disaster Relief simulation as an exercise in public-private-nonprofit coordination. The simulation confirmed that coordination among government, business, and NGOs/IOs is vital for the effectiveness of disaster relief and recovery efforts. Disaster response is learnt to be most effective when each of the stakeholders contributes to both the management and this operation of disaster response efforts.

Design Strategies

Allow tools for open public communication

Have communication system tried, tested and familiarized.

Solution Elements

M Open Access

E Tried System

Design Factor

Severity of conditions under estimated

70

Project Adapting to Climate Change: Rising Seas	Sources Emergency Alert System (EAS), http://www.fcc.gov/cgb/consumerfacts/eas.html Fuhrmann, S., Brewer, I., MacEachren, A, Designing a Human-Centered, Multimodal GIS Interface to Support Emergency Management, GeoVISTA Center. The Pennsylvania State University.	Associated Functions Prioritize rescue mission
Mode Disaster : Response		
Activity Rescuing		
Originator Natrina Toyong		
Contributors		

Observation There is a need to have a well communicated situation updates from credible sources to enable rescue planners to decide most-at-risk areas.	Extension The current Digital Emergency Alert System is an advancement of previous CONELRAD (Control of Electromagnetic Radiation) which allows limited transmission of both digital and audio. The new system however is able to broadcast "bottomless" audio messages (message with no definite ending) and streaming video. It also allows near-instantaneous transmission without the delays. This alert may be sent in text, video and other digital messages via radio, TV, E-mail, Text Messages, Mobile phone or pager. The technology is an improvement of how fast and how accurate alert system can be today. In a research done at Pennsylvania State University, human interaction is considered an important element when drawing out an emergency management system. Emergency management would take into consideration the need to alert and plan out evacuation system where required.
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Design Strategies prepare rescue plans to evacuate in groups and provide an vacation-like evacuation A human to human interaction for warning alert	Solution Elements M Road Trip M Buddy Alert Team
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Design Factor

There is no repository for industrial refuse

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Project

Adapting to Climate Change: Rising Seas

Mode

Disaster : Recovery

Activity

Reconstructing

Originator

Natrina Toyong

Contributors

Sources

Appendix III-4a
New York State Emergency Debris
Clearance Policy and Procedures

Associated Functions

Clean Up

Observation

In certain instances debris left in public right of way within the allocated time set by the State Emergency Office will be collected. However, large amount of repository of industrial refuse cannot served under the same conditions in the events of oil leakages poluting water or chemical wastage hazardous to health. The case is further agravated when these waste traveled beyond the compound of the industiral site.

Extension

Under a State Disaster Emergency Declaration (Section 28, New York State Executive Law, Article 2-B), the Governor normally issues an Executive Order which directs State agencies to take such actions as may be necessary to assist affected areas in repairing, restoring and protecting private and public facilities and to provide such other emergency assistance as would protect the public health and safety.

The NY State Emergency Clearance Policy and Procedures, allows private property owners to place debris in public rights-of-way for the set duration of time which will be collected by State agencies with debris clearance capabilities coordinated the State Emergency Management Office (SEMO).

Following a Presidential Disaster Declaration however, Federal disaster assistance will be used to the maximum extent possible to remove debris and wreckage from publicly and privately owned lands and waters. Such assistance can only be provided when it is judged to be in the public interest.

Design Strategies

Allocate repository site

Collect hazardous waste

Solution Elements

E Dumping Site

M Hazzard Bin

Project
Adapting to Climate Change: Rising Seas

Mode
Disaster : Recovery

Activity
Reconstructing

Originator
Natrina Toyong

Contributors

Sources
Susan Fornoff, Chronicle
Staff Writer San Francisco
Chronicle, March 4, 2006

San Francisco History Center
Photo, courtesy San Francisco
Library

Photo by Marianne Cusato

Associated Functions
Build low cost accomodation



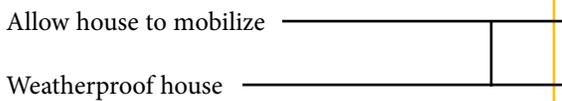
Observation
Structures in disaster prone areas are still not being built to withstand future occurrence. Temporary shelters sometimes end up becoming permanent housing to the lower income group with renovations added to it to sustain growing families.

Extension
Researches and reports are able to produce data to show the uninhabitable buildings if and when disaster strikes. According to the latest report from the Association of Bay Area Governments, a plus-7.0 quake on the Hayward Fault will render 155,000 housing units uninhabitable, displacing 360,000 people and putting 110,000 in need of publicly provided housing. Loma Prieta, by comparison, made 16,000 homes unlivable; Northridge, 46,000. That report is a warning for evacuation but offers no solution to housing crisis after the disaster. Currently, shelters are ones operated by the Red Cross or in a form of FEMA travel trailer. These trailers brought with them social problems and becomes eye sore for a neighborhood.

The latest Katrina disaster has brought about a design for a cottage that is durable, it is affordable and does not blow away in the next hurricane. The cottage, designed by Marianne Cusato and built by Jason Spellings offers disaster victims quick shelter with room to grow.

Looking back in history, disaster relief came to San Francisco in 1906 in the form of more than 5,000 earthquake cottages or shacks, some of which are still standing in various neighborhoods of the city but is not very durable in nature, merely temporary housing that turned permanent out of convinience.

Design Strategies



Solution Elements

- M** Mobile Home
- M** House Armor

Design Factor

Lack of knowledge/experience with desalinization

73

Project Adapting to Climate Change: Rising Seas	Sources FAO Corporate Document Repository, Agriculture Department, "Guidelines for designing and evaluating surface irrigation systems" http://www.fao.org/docrep/T0231E/t0231e00.htm#Contents , W.R. Walker Science Daily, "Engineers Develop Revolutionary Nanotech Water Desalination Membrane ", http://www.sciencedaily.com/releases/2006/11/0611061144813.htm , November 9, 2006	Associated Functions Implement Large Scale Desalinization
Mode Adaptation : Accomodation		
Activity Adapting Food and Water Supply		
Originator Natrina Toyong		
Contributors		

Observation Desalination is being perfected using scientific method in which processes are uses minute nanotechnology.	Extension Recently researchers from UCLA Henry Samueli School of Engineering and Applied Science have developed a new reverse osmosis (RO) membrane which sets a platfrom for reducing seawater desalination and wastewater reclamation cost. Breaktrough technology such as this are good for adaptation to improved farm irrigation techniques. in the other hands general desaliantion processes are important as rising sea level will result in higher salinity of water sources when intruding salt water starts to invade the aquafiers. The common technique of desalainaiion widely used today are reverse osmosis (RO), distillation, electrodialysis, and vacuum freezing. The first two of which more widely used than the latters.
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Design Strategies Create larger scale of existing enabling process	Solution Elements M Grandizing Process
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Design Factor

Directly unaffected entities/organizations refuse to support the process

74

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Collaborating

Originator

Albert Wang

Contributors

Sources

Perverse incentive, wikipedia
http://en.wikipedia.org/wiki/Perverse_incentive

Associated Functions

Inform decision makers

Observation

Organization's main purpose is its own profit, in the age of globalization, the cooperation can transfer from countries to countries, it makes the organization doesn't care local affairs.

Extension

If you want to encourage unaffected entities and organizations get involve in environmental affairs, provide appropriate incentives are important. These are the means of create incentives in general:

1. **Financial incentives** are said to exist where business or community can expect some form of material reward — especially money — in exchange for acting in a particular way.
2. **Moral incentives** are said to exist where a particular choice is widely regarded as the right thing to do, or as particularly admirable, or where the failure to act in a certain way is condemned as indecent. A business acting on a moral incentive can expect a sense of self-esteem, and approval or even admiration from its community; a business acting against a moral incentive can expect a sense of guilt, and condemnation or even ostracism from the community.
3. **Coercive incentives** are said to exist where a business can expect that the failure to act in a particular way will result in force being used against them by others in the community .

But also have to be careful about the after effect of setting incentive, for example, The United States and The Netherlands have a tax deduction for mortgage interest on one's primary residence. While this was intended to promote home ownership among the middle and lower class, some wealthier people with a secure income obtain mortgages with lower down payment, longer term, or both than they would otherwise choose and invest the amount saved at the time of purchase. The government effectively subsidizes the investments

Design Strategies

Set incentive base on honor and reputation.

Set incentive base on money.

Solution Elements

M Safe earth competition (use the competition as an event to encourage community participation)

M Collaboration tax discount (the tax policy encourage community and cooperation support the process)

Design Factor

Structures are beyond repair

75

Project

Adapting to Climate Change: Rising Seas

Mode

Protection : Adaptation

Activity

Erecting Hard Barriers

Originator

Albert Wang

Contributors

Sources

-Levees.Com
<http://www.levees.org>

-New Orleans Levee System
Petition
<http://www.savebigeasy.org/>

Associated Functions

Repair protection structure

Observation

The traditional dikes and levees structure are pretty hard to repair when its done, but the aftermath of dike damage is something can't ignore.

Extension

Levees can fail in a number of ways. The most frequent (and dangerous) form of levee failure is a breach. A levee breach is when part of the levee actually breaks away, leaving a large opening for water to flood the land behind the levee. A breach can be a sudden or gradual failure that is caused either by surface erosion or by a subsurface failure of the levee. A common cause of a levee breach is a boil, or sand boil. A sand boil occurs when the upward pressure of water flowing through soil pores under the levee (underseepage) exceeds the downward pressure from the weight of the soil above it. The underseepage resurfaces on the landside, in the form of a volcano-like cone of sand. If left unattended, a boil that is carrying foundation material with it can carry away enough foundation material that the overlying levee begins to collapse, resulting in a breach. Sometimes levees are said to fail when water overtops the crest of the levee. Levee overtopping can be caused when flood waters simply exceed the lowest crest of the levee system or if high winds begin to generate significant swells in the ocean or river water to bring waves crashing over the levee. Overtopping can lead to significant landside erosion of the levee or even be the mechanism for complete breach.

During the passage of Hurricane Katrina in August 2005, floodwaters breached levees protecting New Orleans, causing catastrophic flooding and resulting in the total evacuation of the city (effects on levees are discussed further in Effect of Hurricane Katrina on New Orleans).

Design Strategies

Make the new structure easy to repair.

Make the old structure easy to switch.

Solution Elements

M Build a new one (find the most efficient way to renew the structure)

M Easy repair structure (when we build the new structure, consider the function of easy repair)

Design Factor

Communities face language, racial, religious, and/or employment problems in new locations

76

Project

Adapting to Climate Change: Rising Seas

Mode

Retreat : Adaptation

Activity

Relocating

Originator

Albert Wang

Contributors

Sources

Personal Observation

Associated Functions

Relocate community

Observation

The migrator always facing the culture, financial, life style shock when they just arrived the new location.

Also the conflict between newcomer and aboriginal group are always happens.

Extension

Relocation in human history are not something new, the small groups of relocation happen everyday in every country. The newcomer has to get used to different types of language, culture, life style, religious and recruit problems in new location. The middle association are the most traditional and almost the most efficiency solution to help new migrator familiar with local affairs quickly.

But the large scale of relocation in history are easy to cause conflict with the local group. The most cases are relocation because of war. The large scale of migration sometimes are easy to associate with invasion in local group's thinking.

Barriers to relocation come not only in legal form; natural barriers to relocation can also be very powerful. Immigrants when leaving their country also leave everything familiar: their family, friends, support network, and culture. They also need to liquidate their assets often at a large cost, and incur the expense of moving. When they arrive in a new country this is often with many uncertainties including finding work, where to live, new laws, new cultural norms, language or accent issues, possible racism and other exclusionary behaviour towards them and their family.

These barriers act to limit international migration: scenarios where populations move en masse to other continents, creating huge population surges, and their associated strain on infrastructure and services, ignore these inherent limits on relocation.

Design Strategies

Using the existing local network.

Solution Elements

M Society rebuild system

Learn from the history to prevent conflict.

M Pre-network activity

Design Factor

Modes of transport is not aligned with the development plan.

77

Project

Adapting to Climate Change: Rising Seas

Mode

Assimilation : Adaptation

Activity

Establishing New Infrastructure

Originator

Albert Wang

Contributors

Sources

Very Large Flexible Barges (VLFBs)
<http://fp.aquamar.plus.com/>

Associated Functions

Identify new sources for raw materials

Observation

The transportation system of aquatecture city are very different than normal transportation system.

Extension

The new generation of aquatecture is a city system locate in the middle of sea, its also will need a unique transportation system it special needs. How to combine the advantage between the ground transportation and marine transportation is the key.

Also in the aquatecture city, the source of clean water is important and if the desalination process are still too expensive. The new type of clean water transport should consider. Very Large Flexible Barges (VLFBs), also known as Water Bags or Medusa Bags, are an idea for the transoceanic shipment of high quality drinking water, currently in prototype stage. VLFBs may also in future have a role as floating reservoirs. These vessels could be towed singly or in a group by a suitably sized tugboat. The maximum towing speed would be approximately 3 knots and when empty the barges could either be towed or recovered and stowed on the deck of a tug or a support vessel. VLFBs would be manufactured from a flexible membrane, buoyancy relying on the contents or cargo being less dense than the surrounding seawater.

Design Strategies

Develop customized transportation system for aquatecture city.

Solution Elements

M Aqua/air-transportation

Design Factor

Outbreak of diseases

78

Project

Adapting to Climate Change: Rising Seas

Mode

Response : Disaster

Activity

Sustaining

Originator

Albert Wang

Contributors

Sources

Prevent Illness after a Natural Disaster, Centers for Disease Control and Prevention
<http://www.bt.cdc.gov/disasters/illness.asp>

Associated Functions

Provide basic utilities

Observation

The diseases always speared out after the disaster impact a certain area, the flood carry the lots of disease germs by dirty water, the sanitation condition is bad and human's resistance are weaker than normal days.

Extension

After nature disaster people are exposed in high risk environment, including nature related disease and pollution related disease, there are the principle of disease prevention after natural disease under:

Principle of Prevent Illness after a Natural Disaster

1. Protect Yourself from Animal- and Insect-Related Hazards
2. Prevent Carbon Monoxide Poisoning
3. Clean Up Safely After Floods
4. Keep Food and Drinking Water Safe
5. Wash Your Hands
6. Infectious Disease
7. Protect Mental Health
8. Avoid Mosquitoes
9. Prevent Illness from Sewage
10. Prevent Temperature-Related Illness
11. Prevent or Treat Wounds

Design Strategies

Decrease germs in the environment.

Enhance human heath.

Solution Elements

M Satellite/airplane germ kill light system

M Disease prevent medicine mix in supply food/drink

Design Factor

Inability to control dangerous effluent

79

Project

Adapting to Climate Change: Rising Seas

Mode

Response: Disaster

Activity

Sustaining

Originator

Albert Wang

Contributors

Natrina Toyong

Sources

Thomas Net Industrial Newsroom, "Encapsulating Polymer Absorbents handle hazardous spills", <http://news.thomasnet.com/fullstory/470813>, Nov 28, 2005

Boca Raton's National Pollution Discharge "Hazardous Material Storage and Inspection" http://www.ci.boca-raton.fl.us/services/Stormwater/htmls/haz_mat.html

Associated Functions

Provide Sanitation

Observation

In disaster events where water is involved, containment of hazardous substance need to be secured before it gets into the water.

Extension

A breakthrough for a unique encapsulating polymer absorbents were made by JNJ Industries, Inc. of Franklin Massachusetts, USA. They have been a leading supplier of electronic and industrial cleaning product and are active in researches. The breakthrough polymer is capable of absorbing hazardous hydrocarbon based and aqueous based fluids, encapsulating them, rendering them inert, and making them safe for disposal.

In most cases, dealing with hazardous waste is easier with stricter containment rule before it is disposed of. Following this an even stricter rule to meet the proper disposal methods. Industries will require permit for disposal of the waste in which case the best solution is for the industry is to revisit its strategies to produce less waste.

Best form of pollutant control in general is to tackle the problem at its root. Or contain it before it spreads. This will be a slightly complicated process where water is concern as the spread will be twice as fast and clean-up as hard.

Design Strategies

A safety attire to be worn when dealing with hazardous substance

Solution Elements

E Protection Suit (Self-protection kit)

Design Factor

Rescue workers exposed to hazards

80

Project Adapting to Climate Change: Rising Seas	Sources National EMS Mangement System, Rural EMS Workforce Paper, http://www.nemsma.org/ , Nov 2005	Associated Functions Identify safe areas
Mode Response: Disaster		
Activity Rescuing		
Originator Albert Wang		
Contributors Natrina Toyong		

Observation Exposure comes in different forms and in the case of water from flooding, debris and the magnitude of the current is a factor that will cause major injuries.	Extension In the process of identifying a safe evacuation zone, rescue workers are most at risk while exploring unknown territory. In the event of sudden disaster, the decision for evacuation zone may lie on rescue workers where helpless evacuees will turn on the rescue worker with complete trust for deliverance. Other expected scenarios based on reports is that rescue workers may experience fatigue from the continuous labor. This may lead to carelessness in the part of the worker and they could easily sustain injury.
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Design Strategies A tool kit containing rescue essentials Temporary safe containment box for single occupancy.	Solution Elements E Worker Escape Package. S Worker Safe Cube
---	--

Design Factor

System for receiving immediate acknowledgement of

81

<p>Project Adapting to Climate Change: Rising Seas</p> <hr/> <p>Mode Preparation: Disaster</p> <hr/> <p>Activity Alerting</p> <hr/> <p>Originator Albert Wang</p> <hr/> <p>Contributors Natrina Toyong</p>	<p>Sources National Geohraphic, "Satellite Global Disaster Alert System Planned", http://news.nationalgeographic.com/news/2005/01/0124_050124_geoss.html, January 24, 2005</p>	<p>Associated Functions Alert disaster team</p>
<p>Observation Despite existing public alert system, alert system are delayed as it goes through multiple channel for the news to reach the general public.</p>	<p>Extension The speed of current technology for the alerter to alert the the general public is significantly fast with the current technology we have today. The problem there in lies not in the device to alert the public but the short amount of time from the time of authorities are made aware of the impact to the time of impact itself.</p> <p>The need is to be able to anticipate an emergency good long hours before a disaster is schedule to strike. This will give ample time not only to provide warning, but to take action for it. Communication is an important element not only to alert but to guide evacuation processes. Therefore, it should never encounter failure during a disaster as it will paralyse the evacuation in progress.</p>	
<p>Design Strategies Maintain communication infrastructure. —————</p> <p>Strengthen disaster warning service and normal days training. —————</p> <p>A program to anticipate and predict emergency events. —————</p>	<p>Solution Elements</p> <ul style="list-style-type: none">M Self-repair/construct communication robotM Disaster warning squadM Disaster Anticipation Program	

Project

Adapting to Climate Change: Rising Seas

Mode

Communication

Activity

Educating Public

Originator

Kristy Scovel

Contributors

Sources

<http://usinfo.state.gov/media/Archive/2005/Jan/26-288268.html>

Associated Functions

Produce Media Content
Select Appropriate Distribution Channels

Observation

Disinformation refers to false or misleading information that is deliberately spread by a government, organized political group, the media, an individual or other entity. The issue of intent is key; if the intent is to spread false or misleading information, it is disinformation and can create mass confusion or panic.

Extension

The USSR's disinformation campaign on AIDS is the classic example. The Soviet intelligence and security service, the KGB, had a special service, Service A, for spreading false information. For example, soon after AIDS was recognized as a new disease, Service A concocted the story that the AIDS virus had been developed as a biological weapon by the Pentagon at Fort Detrick, Maryland, and was used in experiments on prisoners, which was allegedly why it initially appeared in New York, described as the largest big city near Fort Detrick. Several major U.S. cities are actually much closer to Fort Detrick than New York, including Washington, DC, Baltimore, and Philadelphia, but few non-Americans realize that.

On March 17, 1992, Yevgeniy Primakov, who was then head of the Russian Foreign Intelligence Service, a successor of the KGB, admitted that "the articles exposing U.S. scientists 'crafty' plot against mankind [in allegedly manufacturing AIDS] were fabricated in KGB offices," as reported in the March 19, 1992 issue of the Russian newspaper Izvestiya. The Soviets knew the allegations were false, but spread them as part of their policy of spreading vicious lies about the United States. This is disinformation.

Design Strategies

Establish "the source" for all rising seas information

Publicly discredit all media providing disinformation

Solution Elements

S The Harbor

S Sinking Ships Teams and Notifications

Project

Adapting to Climate Change: Rising Seas

Mode

Retreat: Adaptation

Activity

Decommissioning Infrastructure

Originator

Kristy Scovel

Contributors

Sources

<http://www.freepatentsonline.com/7069690.html>

<http://www.freepatentsonline.com/7094268.html>

<http://adsabs.harvard.edu/abs/1997APS..DPPgTP311A>

<http://www.bbsrc.ac.uk/life/clean-up/detect.html>

<http://www.waterencyclopedia.com/Oc-Po/Pollution-of-Groundwater.html>

Associated Functions

Secure sewage systems
Deactivate hazardous sites
Clear disaster site infrastructure of pollutants

Observation

Following the detoxification of a damaged area, there may be undetected or underestimated pollutants that remain. Lingering pollutants such as arsenic, phosphorous, or other metals, hydrocarbons, bacterial, chemical, and particulate pollutants are an additional source of stress that can affect the recovery of injured species and harm the inhabitants of a region.

Extension

Several steps normally are taken to clean up a site once contamination has been discovered. Initially a remedial investigation is conducted to determine the nature and extent of the contamination. In the risk assessment phase, scientists evaluate if site contaminants might harm human health or the environment. If the risks are high, then all the various ways the site might be cleaned up are evaluated during the feasibility study. The record of decision is a public document that explains which of the alternatives presented in the feasibility study will be used to clean up a site.

Usually, the most protective, lowest cost, and most feasible cleanup alternative is chosen as the preferred cleanup method which may not remove all hazardous pollutants from the site.

Design Strategies

Detect lingering pollutants

Remove lingering pollutants

Solution Elements

E Smart Bacteria

E Plant Ferns

E Pollution Trap

E Electrostatic charging apparatus

Design Factor

Collected data is not communicated to decision makers

84

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation: Accommodation

Activity

Adapting Food and Water Supply

Originator

Kristy Scovel

Contributors

Sources

http://gsa.confex.com/gsa/2006DRO/finalprogram/abstract_116953.htm

Associated Functions

Monitor changes in estuarine habits and their impacts on fisheries

Monitor estuaries and aquifers for salinity increases

Observation

Decision makers and industry leaders are tasked with the responsibility of providing direction for groups of individuals. The required information to make these decisions often involves a broad knowledge base and various expertise.

Extension

A common lament among scientists is the non-use or misuse of science in decision making, and a common lament among policy makers is the lack of “useful” scientific information upon which to base decisions, as well confusion over the often conflicting results of scientific investigations. Adding to the challenge is the commitment of many scientists to positions of non-advocacy and to scientific thoroughness while decision makers are pressed to make decisions on the basis of the best available science. The role of scientist as “expert” is also being challenged by society. New approaches offer a way to bring the scientist more effectively into the policy arena. In particular, collaborative approaches are transforming societal decision making and hold promise for achieving longer term consensus around critical societal decisions.

Design Strategies

Create communication tool to provide the proper people with knowledge

Ensure that decision makers have read and understand information

Provide live Q & A forum

Solution Elements

E C-Comm

Design Factor

Lack of Knowledge/Experience with Flood/Salt resistant crops

85

Project

Adapting to Climate Change: Rising Seas

Mode

Adaptation: Accommodation

Activity

Adapting Food and Water Supply

Originator

Kristy Scovel

Contributors

Sources

<http://www.selfsufficientish.com/container.htm>

<http://news.mongabay.com/2006/1204-cigar.html>

Associated Functions

Monitor changes in estuarine habits and their impacts on fisheries

Monitor estuaries and aquifers for salinity increases

Observation

With the advent of rising seas, the overflow of salinated water will begin to infiltrate currently fertile soil, contaminating it with salt. This will pose a problem due to the inability of most plants to grow in this type of soil and the lack of experience of farmers have in growing these types of crops.

Extension

CIGAR is working to develop crops that can better withstand heat, salt, submergence or waterlogging, and drought as well as to promote “more efficient farming techniques to help poor farmers better use increasingly scarce water and fragile soil.” Further researchers are also looking for ways to use agriculture to reduce greenhouse gases emissions.

“The impacts of climate change on agriculture will add significantly to the development challenges of reducing poverty and ensuring sufficient food production for a growing population,” said Dr. Robert S. Zeigler, Director General of the International Rice Research Institute (IRRI), a CGIAR-supported research center. “The livelihoods of billions of people in developing countries, particularly those in the tropics, will be severely challenged as crop yields decline due to shorter growing seasons.”

“Anticipating and planning for climate change is imperative if farmers in poor countries are to avert forecast declines in yields of the world’s most important food crops,” said Dr. Louis V. Verchot, a climate change scientist with the World Agroforestry Center (ICRAF), a CGIAR-supported research center. “Yet, adaptation is not a substitute for reducing new and removing existing greenhouse gases from the atmosphere--our only long-term option.”

Design Strategies

bring in a team of experts

grow food

conduct experiments

record results

Solution Elements

E Expert Farming

E Crops in Containers

E The Science and Technology for Upgrading Future Farms

Design Factor

Surrounding Area has Been Destroyed

86

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster: Preparation

Activity

Evacuation

Originator

Kristy Scovel

Contributors

Sources

Associated Functions

Locate Site for Temporary Relief Camp

Gather Resources

Identify Disaster Teams and Volunteers

Observation

Following a disaster, wide spread panic can ensue if appropriate measures are not taken to secure resources and evacuate the population to a safe, stable location. Systems must be put into place to ensure that resources and a temporary relief camp can be secured when the surrounding area has been destroyed.

Extension

During 2005, hurricane Katrina hit the city of New Orleans. Unprepared for the size and ferocity of this disaster, the town found itself in crisis both during the storm and the period that followed after. Many residents of New Orleans, improperly warned of the dangers of the hurricane, decided not to evacuate their homes early, and perished as a result. Those that remained, but survived, were left stranded in the middle of a flooded war zone, with little to no governmental supervision or leadership. People were begging for someone to take charge. When no one came forward, the city was plagued with crime and death. Refugees of this disaster were shuttled off to nearby churches and the Silverdome, places that were horrifically short on relief workers and aid. If better disaster planning was initiated, these atrocities would have been greatly diminished.

Design Strategies

Use satellites to identify closest undamaged area

E Satellite Surveillance

Activate local leaders to organize disaster relief supplies

E First Mate Program

Design Factor

Evacuees with Health Concerns Require Additional Assistance

87

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster: Preparation

Activity

Evacuation

Originator

Kristy Scovel

Contributors

Sources

Associated Functions

Identify means of mobilizing evacuees

Observation

During a disaster, it is important to remain attentive to those who have special needs in order to evacuate, including the elderly, the handicapped and small children. It is easy for these people to be overlooked in the panic that ensues, so the community must be fully aware of their role in helping those in need to evacuate.

Extension

Because a disaster situation is more dire for those who have special needs, it is important that they be fully aware of emergency procedures well in advance of any disaster. Emergency preparedness plans should be thoroughly constructed, including travel and lodging arrangements. The city should be pro-active in registering the needs of these people and responding to them appropriately. In addition, educational materials should be provided to the public through a variety of channels. It is extremely important to reduce the number of possible problems well in advance.

Design Strategies

Provide advance evacuation preparedness info to those with previously determined health needs

Transport the physically challenged from disaster area

Solution Elements

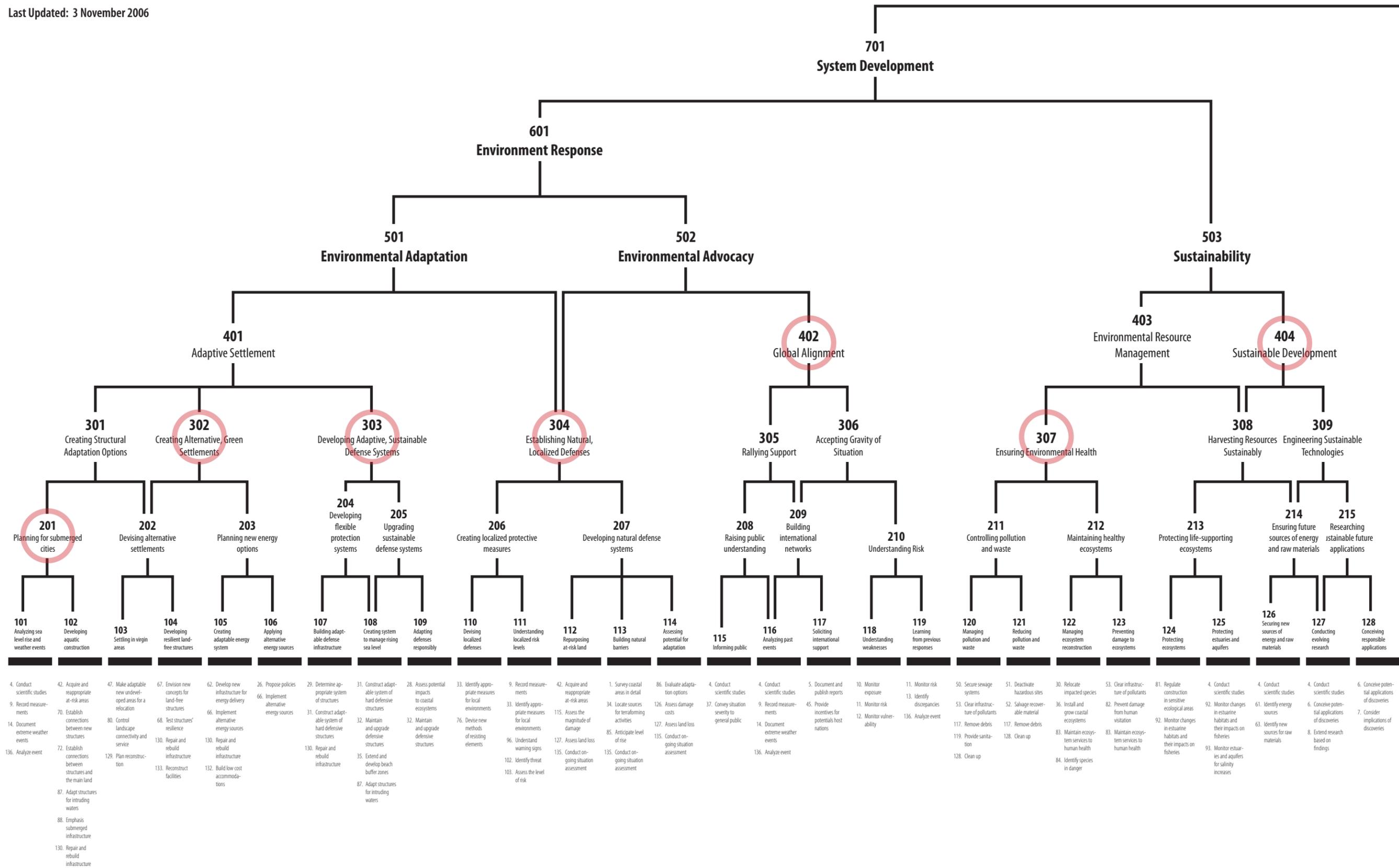
E Smooth Sailing

E The Arc

Information Structure

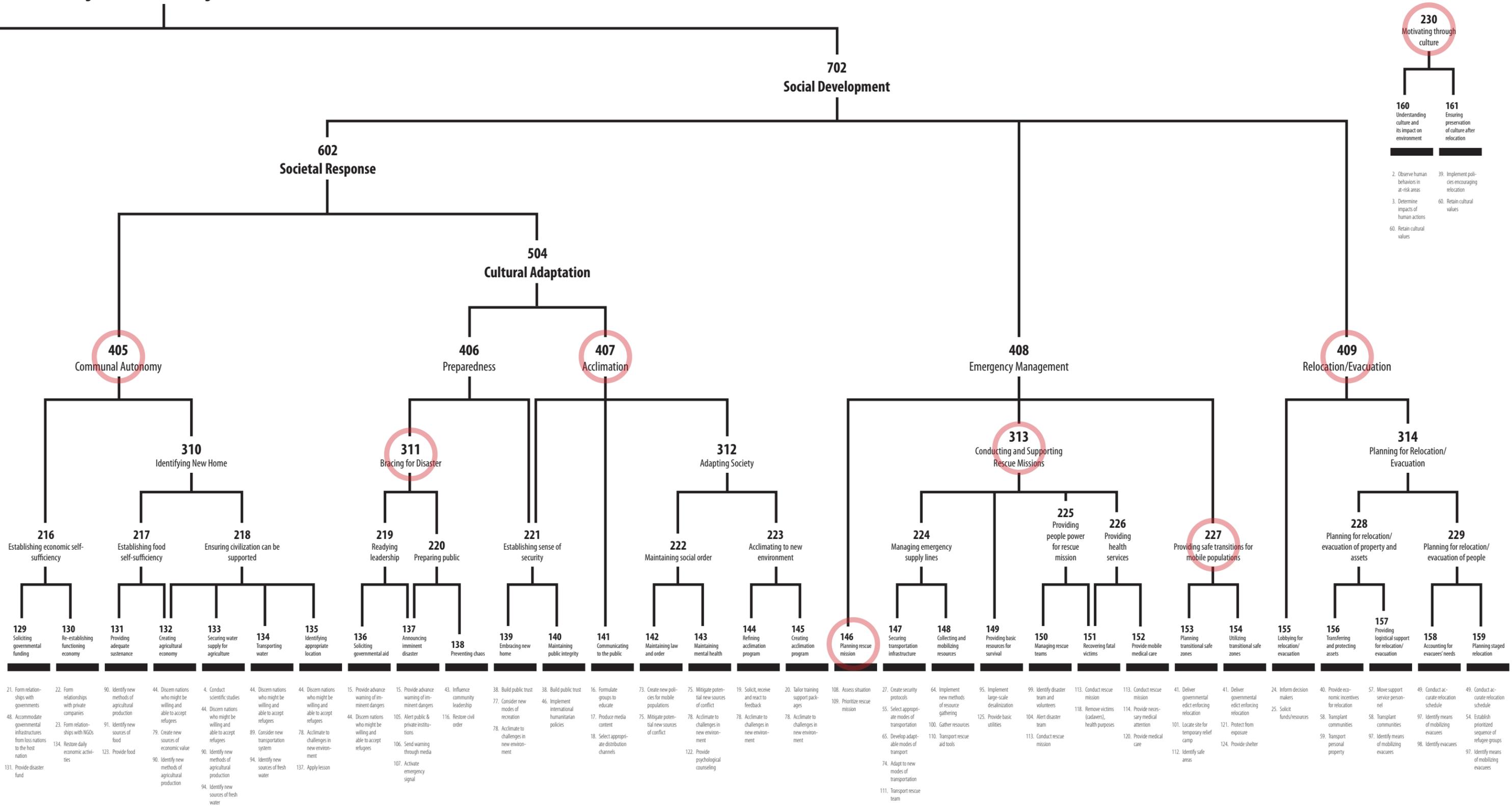
Massive Change: Living in a World with Rising Seas

Last Updated: 3 November 2006



801
Living in a World with Rising Sea Levels

Note: Cluster 230 is disconnected



Activity Analysis

Activity Creating Adapted Structures

1

Project

Adapting to Climate Change: Rising Seas

Mode

Adaption: Assimilation

Originator

Kristy Scovel

Contributors

Natrina Toyong

Scenario

As rising seas change the way in which people live, the physical structures and infrastructure of communities must adapt to embrace this new environment.

Users

members of the community
decision makers
construction workers
mechanical engineers
architects
environmental engineers
policy makers

System Components

computers
e-mail
telephones
technical drawings
industrial equipment
construction material

Environmental Components

meeting rooms
construction sites
community gathering areas
private homes
public institutions
law offices

System Functions

Envision new concepts for land-free structures

Test structures' resilience

Build land-free structures

Establish connections between
new structures

Build temporary structures

Establish connections between structures and
the main land

Associated Design Factors

The appropriate talent pool is not available to engineer structures

New concepts may jeopardize ecosystem

Tests fail to adequately detect reliability of structures

Structures are not soundly built

Construction equipment is not available

Structures do not endure off shore

Water interferes with construction

Connections require proper planning to accommodate future structure
development

Activity Analysis

Activity Networking

2

Project

Adapting to Climate Change: Rising Seas

Mode

Communication: Collaboration

Originator

Kristy Scovel

Contributors

Natrina Toyong
 Gabriel Biller
 Elisabeth Martinez de Morintin
 Albert Wang

Scenario

Collaborating with other entities to share resources and information.

Users

Decision Makers
 Industry Leaders
 Policy Proponents
 Legislative Body
 Environmental Organizations
 Institutional Leaders

System Components

E-mail
 Letters
 Telephone
 Contracts
 Resources
 Transportation

Environmental Components

Meeting Sites

System Functions

Form relationships with private companies

Form relationships with NGO's

Coordinate the logistics of the provided aid

Solicit Funds

Associated Design Factors

Combating or adapting to rising seas conflicts with the business interests of the company

Resources or services are too costly to utilize

The resources of the approached NGO's are already committed

Unaffected communities refuse to support the process

Unable to secure necessary manpower

Entities are unreceptive or unwilling to donate

No means to distribute obtained funds

Project

Adapting to Climate Change: Rising Seas

Mode

Analysis: Researching

Activity

Determine impacts of human actions

Originator

Eric Niu

Contributors

Eric Niu
Gabriel Biller
Natrina Toyong
Albert Wang
Elisabeth Martinez de Mortenin

Description

A centralized global repository of scientific data containing empirical data to incorporate into global research and prediction. This scientific data among the scientific community.

Source

<http://www.grid.unep.ch/index.php>

Properties

- Authoritative global database of scientific data
- Team of scientists and policymakers dedicated to reviewing the global environment and assessing environmental trends
- Global array of climatic monitoring devices
- Computer and software systems for collecting, archiving, and analyzing environmental data

Features

- Generates and acquires global scientific data pertaining to the world's environmental state
- Analyzes scientific data and assesses trends and implications
- Regularly publishes major concerns, trends, and emerging issues with inferred causes and social & economic impacts
- Broadcasts 'early warning' of slow, but continuous, hazards
- Provides open access to authoritative meta-data and data sets
- Advises decision makers on the implications of their activities
- Builds upon the peer-review foundation to discern which theories and data can be most trusted

Associated Function/s

- Survey coastal areas in detail
- Conduct scientific studies
- Conceive potential applications of discoveries

Source Design Factor/s

Implications of discoveries change as other discoveries are made

Solution Element

E M S

First Mate Program

1

Project

Adapting to Climate Change: Rising Seas

Mode

Disaster: Preparation

Activity

Evacuation

Originator

Kristy Scovel

Contributors

Eric Niu
Gabriel Biller
Natrina Toyong
Albert Wang
Elisabeth Martinez de Mortenin

Description

A program that recruits and trains trusted members of the community to assume local leadership in the event of a disaster. These volunteers should be prepared to act independently in the event of loss of communication with government officials.

Source**Properties**

- An educational program
- A community outreach effort
- A way to foster local leadership
- A contingency plan
- Emergency preparedness
- An established chain of command

Features

- Familiarizes members of the community with evacuation procedures and emergency response protocol
- Creates a sense of ownership and pride among members of the community
- Provides a sense of independence and empowerment
- Connects members of the community
- Structures an emergency evacuation plan/disaster preparedness protocol for communities
- Establishes a local hierarchy in the event that communication with established leaders is

Associated Function/s

- Understand warning signs
- Identify evacuees
- Gather resources

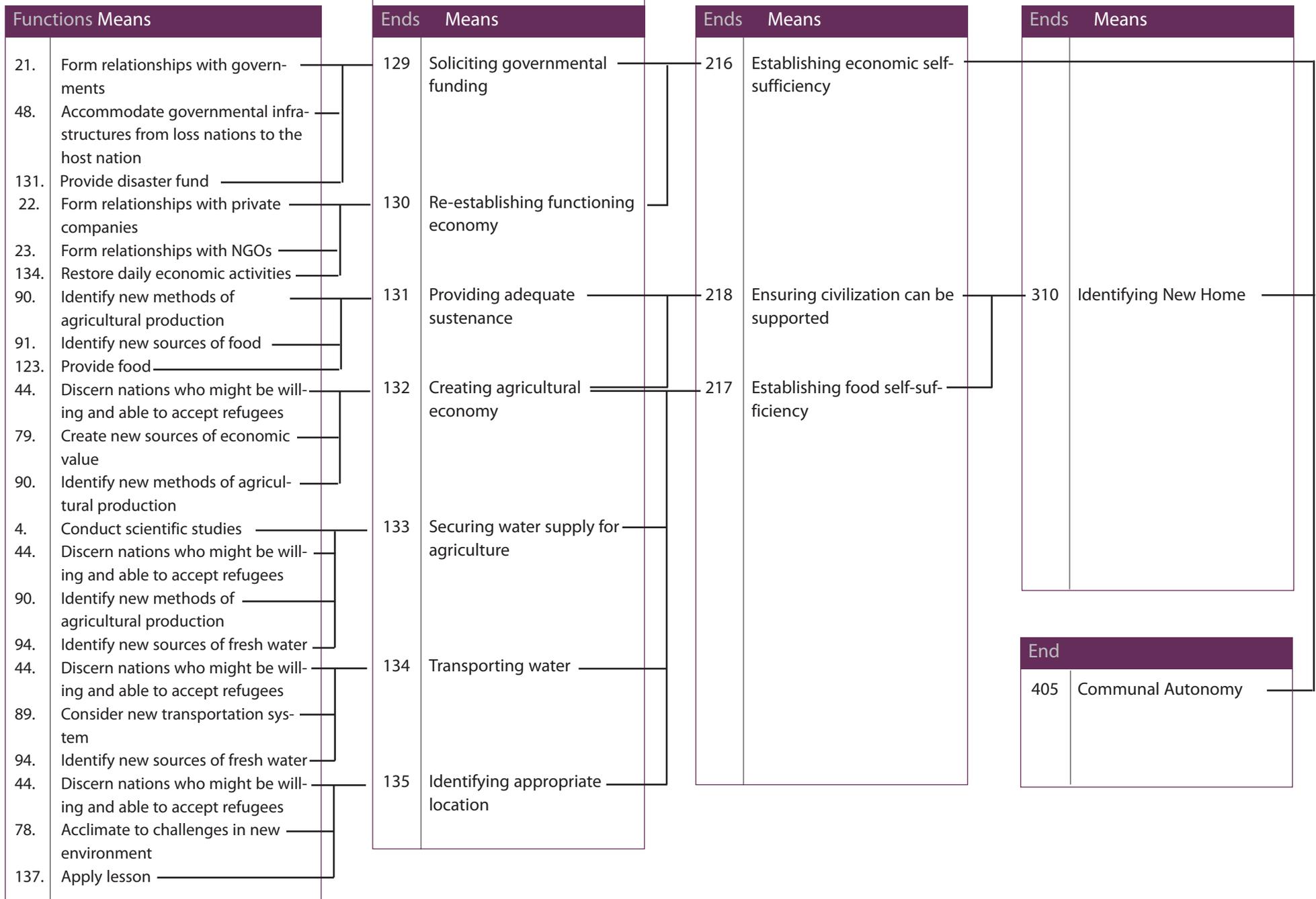
Source Design Factor/s

Surrounding area has been destroyed

Means/Ends Analysis

Rising Seas: System Element Type

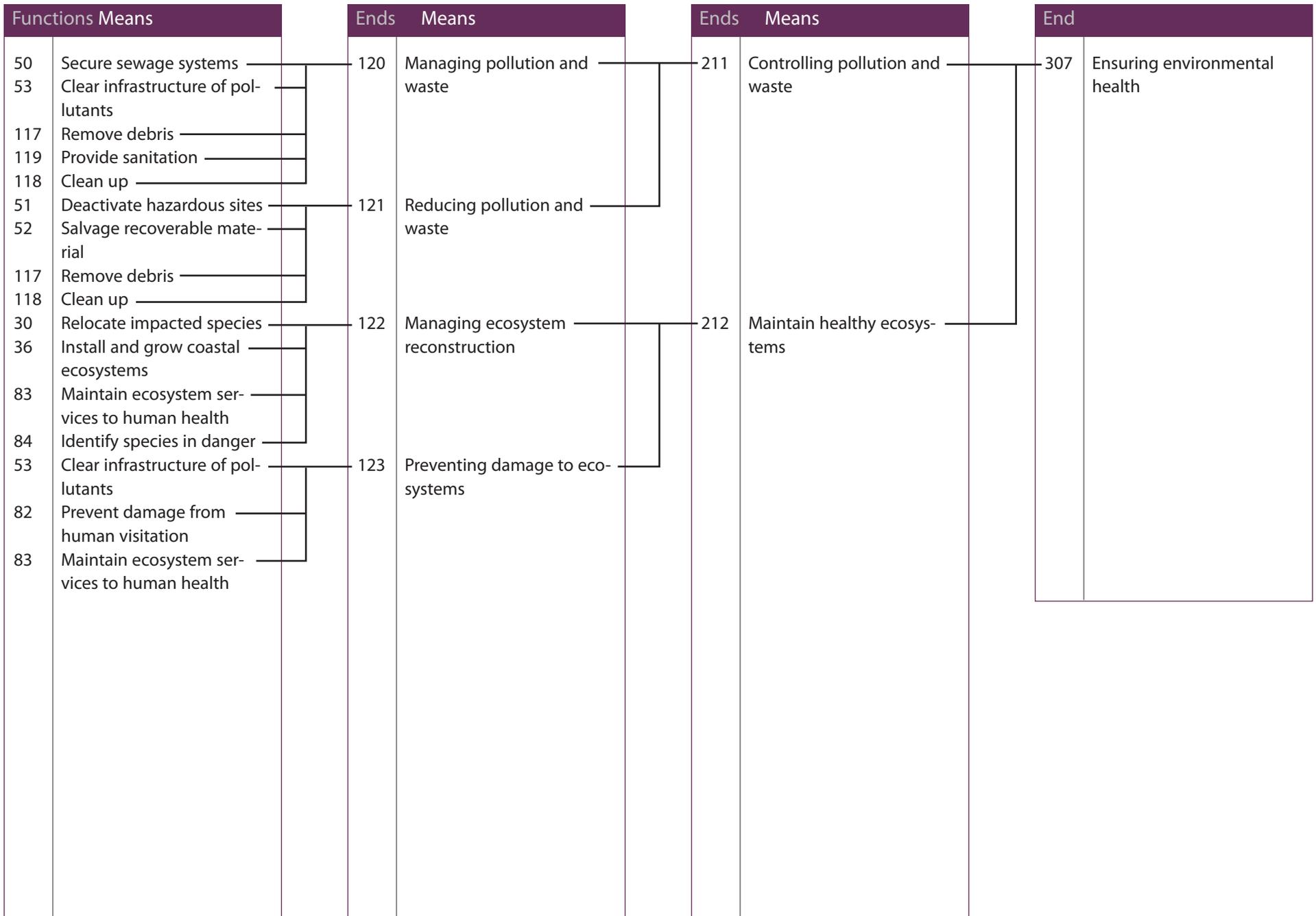
Cluster 405



Means/Ends Analysis

Rising Seas: System Element Type

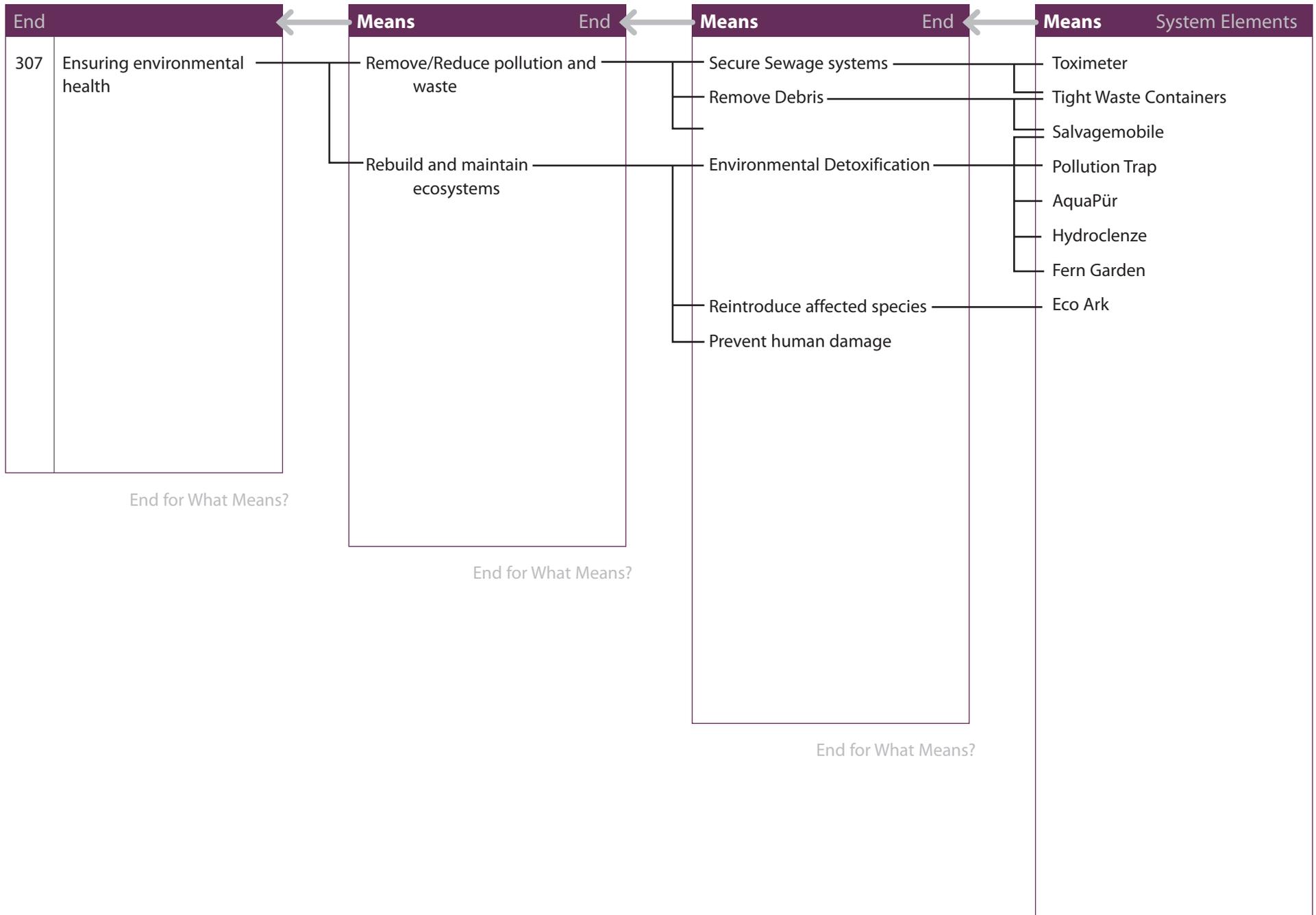
Cluster 307



Ends/Means Synthesis

Project: Living in a World with Rising Sea Levels

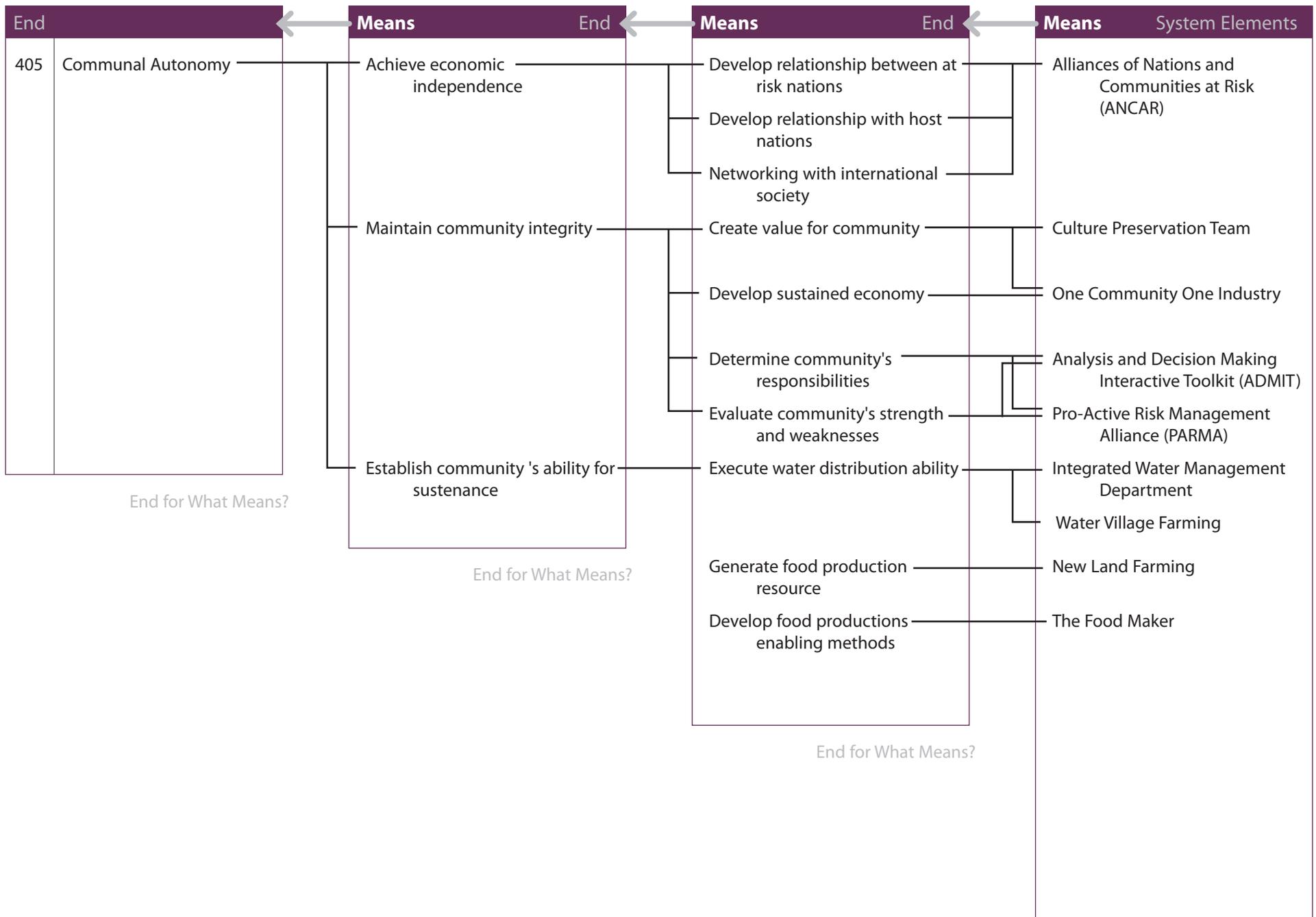
Cluster 307



Ends/Means Synthesis

Project: Living in a World with Rising Sea Levels

Cluster 405



System Element Relationships

Rising Seas: Resource Management - Physical Systems
System Elements Pairing 9 - 12 with 13 -16

2

<p>9 New Land Farming</p>	<p>CRW provides lend extension capabilities and time before farming relocation</p> <p>1</p>			
<p>10 The Food Maker</p>	<p>0</p>	<p>Provides necessary resources for population</p> <p>2</p>		
<p>11 Toximeter</p>	<p>0</p>	<p>0</p>	<p>Pollution detector system is needed, to ensure sea port infrastructure sustainability</p> <p>2</p>	
<p>12 Eco Ark</p>	<p>CRW creates a potential new preservation area to accommodate Eco Ark</p> <p>2</p>	<p>0</p>	<p>0</p>	<p>0</p>

Scoring
3 Critical Relationship
2 Strong Relationship
1 Slight Relationship
0 No Relationship

<p>13 Coastal Retention Web</p>	<p>14 Defensive Energy Network of Turbines (DENT)</p>	<p>15 Anchored Floating Seaports (AFS)</p>	<p>16 Modular Adaptive Shield System (MASS)</p>
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System Element Relationships

Rising Seas: Emergency Management - Data, Analysis, Decision making, Networking
System Elements Pairing 1 - 4 with 5 - 8

1

<p>1 Child Registry</p>	<p>0</p>			
<p>2 Disaster Anticipation and Management Program (DAMP)</p>	<p>GEOSS provides global information to DAMP</p> <p>3</p>	<p>0</p>		
<p>3 Systematic Emergency Alert (SEA)</p>	<p>0</p>	<p>0</p>	<p>SEA executes strategies from deSEAsion Maker 3000</p> <p>2</p>	
<p>4 Alliance of Nations and Communities At Risk (ANCAR)</p>	<p>ANCAR solidifies their unified position based on the data received from GEOSS</p> <p>3</p>	<p>ANCAR communicates Research Authority Monitor findings to the scientific community</p> <p>3</p>	<p>ANCAR Provides global electronic database resources, to deSEAsion Maker 3000</p> <p>2</p>	<p>Global report sharing</p> <p>1</p>
<p>Scoring 3 Critical Relationship 2 Strong Relationship 1 Slight Relationship 0 No Relationship</p>	<p>5 Global Earth Observing System of Systems (GEOSS)</p>	<p>6 Research Authority Monitor</p>	<p>7 deSEAsion Maker 3000</p>	<p>8 Analysis and Decision Making Interactive Toolkit (ADMIT)</p>

Originator Natrina Toyong	SuperSet Element(s)	Related Elements <ul style="list-style-type: none"> • Integrated Water Management Department • AquaPür • Salvagemobile • Marine Systems for Generating Sustainable Energy (MSGSE)
Contributors Eric Niu Kristy Scovel		
Sources <ul style="list-style-type: none"> • http://www.epa.gov/climatechange/effects/coastal/index.html • http://www.abc.net.au/science/expert/realexpert/desalination/06.htm • http://www.ecy.wa.gov/programs/sea/puget_sound/beaches/estuary.html • http://www.ciesin.org/docs/fs102.html 	SubSet Element(s) <ul style="list-style-type: none"> • New-Land Farming • Water Village Farming • Hybrid Farming 	

Description

A collaborative program between communities at risk which allows for three areas of adaptive food making activity. The program allows food exchange and acts as meeting point between seller (farmers, manufacturer) and buyer (manufacturer or wholesaler), while creating opportunities for transportation services and encourages Expert Farming methods.

The Food Maker is a portfolio of adaptable food making strategy in a world of rising sea.

The three Division of FOOD MAKER are:

1. **New-Land Farming** (Retreat from drowned farming areas and relocate in-land)
2. **Water Village Farming** (Accommodate to rising sea level)
3. **Hybrid Farming** (Adaptation to high salinity land/water)

Properties

- A consultancy program.
- Community of food producer as the resource feeder for the resource development program
- An active centre to collect and provide new or adaptive food making technique.
- Database of Food-Making processes.
- A situation evaluation software to analyse specific.
- An online hub and i-office for management.
- A user kit for custom-tailored implementation plan.
- A local centralized management centre.

Features

- Allows farmers to adapt to new environment with a custom tailored plan.
- Provides farmers with a step by step guide to implement their personalized farming plan.
- Support farmers by allocating dedicated consultant on case-to-case basis.
- Provides a channel for contribution of new or adaptive farming techniques.
- Offers scientist an outlet for ready scientific research participations.
- Provides solution for farmers who choose to retreat and relocate from drowned farmlands.
- Provides solution for farmers to accommodate to rising sea level.
- Provides solution for farmers to adapt to high salinity in land and water.

Fulfilled Functions

- 4. Conduct scientific studies
- 22. Form relationships with private companies
- 23. Form relationships with NGOs
- 44. Discern nations who might be willing and able to accept refugees
- 79. Create new sources of economic value
- 89. Consider new transportation system
- 90. Identify new methods of agricultural production
- 91. Identify new sources of food
- 94. Identify new sources of fresh water
- 123. Provide food
- 134. Restore daily economic activities

Discussion

The Food Maker is collaborative program among communities at risk which support various strategies for adaptive food production. The three strategies take into consideration the three possible conditions in dealing with a world of rising sea. Its adaptive attributes are highly related to the future population adaptation with high probability that as the signs of rising sea become more evident, the world will witness a massive change of habitual pattern along with obvious environment change.

The Food Maker program allows food exchange and acts as meeting point between seller (farmers, manufacturer) and buyer (manufacturer or wholesaler), while creating opportunities for transportation services and encourages Expert Farming methods.

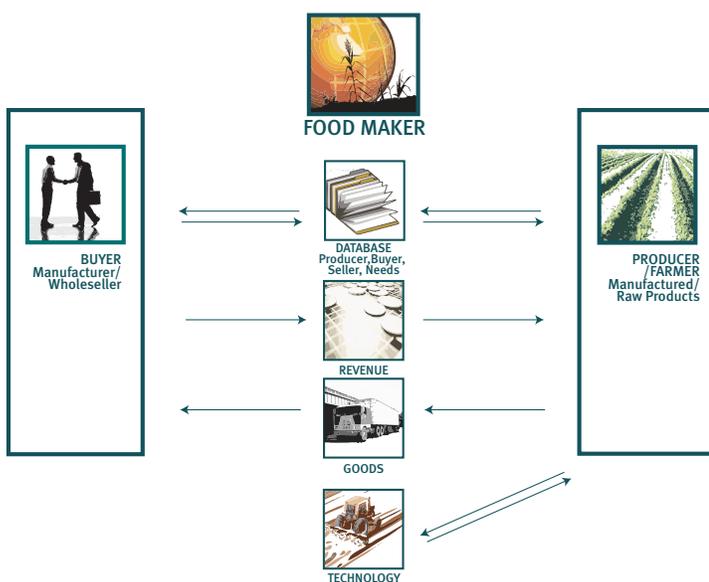
Playing the role as middle person, Food Maker helps set up a portal where buyers and sellers will be able to request for needs or offer to fill a need. On top of that, transportation and technology comes to play in a supporting role not as an entity of the system but enablers, creating business opportunity along the way.

Individual farmers will have a comprehensive business plan which is pre-determined before the food production begins. A central hub is provided via an I-Office link online with simple interfaces for farmers or their representative to keep track of the relationship with buyers.

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Most coastal areas may be abandoned with preference towards the safer in-land areas where population will not be at mercy of unpredictable weather events. Currently, the population development is by far the biggest known contributor to the decline of the coastal ecosystem. With a possible retreat of the population, slow re-evolution of some habitats crucial to food production may be possible. It will be the silver lining in the otherwise dark future that some may imagine. Due to the slow pattern of rising sea, natural habitat in abandoned coastal may gain the perfect slow process to evolve with the changing climate.

Some areas in the other hand may experience a change of salinity level. Higher water table will result in higher salinity count to soil. These are among consideration taken into account when strategies for food production are created. On top of soil salinity, rising sea water may also be the cause of salt lakes, either by drowning lowland areas or intruding sea water mixing with existing lakes.



Discussion (continued)

Researches show these possible environment which will come with the rising sea. The Food Maker shapes its strategies based on the three areas of concern,

1. New-Land Farming; retreat from drowned surroundings and relocate to more sustainable environment.
2. Water Village Farming; embrace the intrusive water and turn the vast coastal land into food producing environment.
3. Hybrid Farming; using technology to adapt to high salinity in soil and water.

The first strategy

In the instant where impact and forces of the rising sea fares negatively on coastal environment or translate into persistent flooding of farm areas, the best option is to relocate to a more prosperous land. The Food Maker, working as the middle person will be able to sit through the process with a farmer and run through options for land, crops and method that best fit the new life that the evacuated farmer is capable of.

The second strategy

The strategy provides solution for assimilating food-making processes to rising sea environment. The methods allow farmers to embrace the situation by utilizing combination of technological and natural solution to continue producing food.

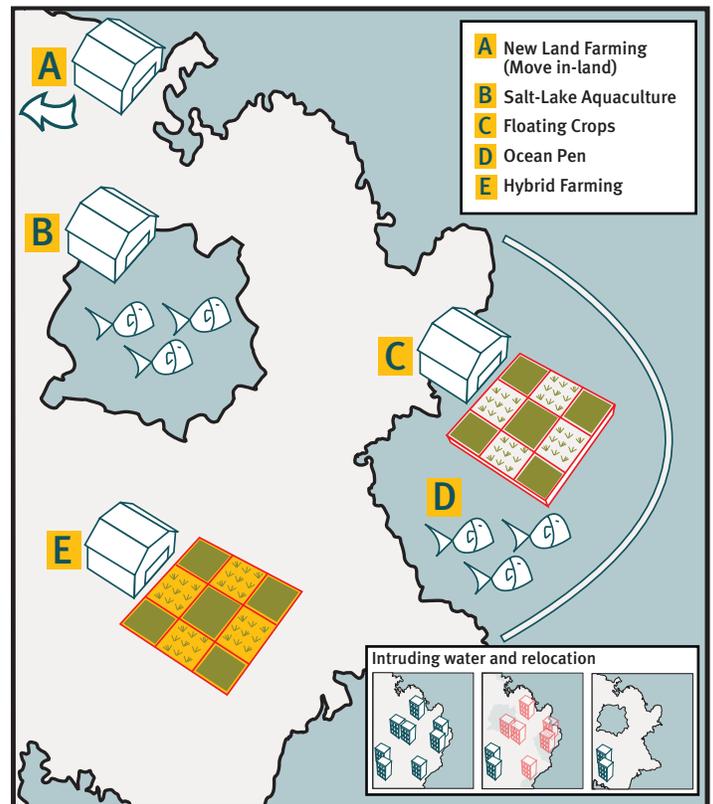
In a world of rising seas, the sea level rise, rapid or gradual may cause population to abandon coastal areas with fear of going underwater. This method embraces this scenario and uses the abandoned sea side for adaptive agriculture and aquaculture.

Aquaculture may also be initiated on emerging in-land lakes which may emerge as a result of flooding of low lands by rising sea level.

The third strategy

The strategy came to being due to the fact that sea level rise does not only paralyze all purposeful activities on coastal lands but may also impact the activities on adjacent in-land environment. A problem likely to occur is an increase of salinity level in both land and water. This threatens human uses of water and land especially for self sustenance.

The Hybrid Farming method will train and assist farmers in desalination for farming purposes using various techniques. The techniques are adaptation of existing solutions alongside scientifically engineered solution for crops and farming facilities.



Scenario

The Kiran family has lived on farming. This family business is the source of living for their generations and many other families in Bangladesh. Over the decade their ancestors have managed to develop a strong chain of producers and marriage has expanded their farming life to all corners of Bay of Bengal. In November 1970, a cyclone hit the area and 500,000 people died. This tragedy was among the dark episode in the Kiran lives, with the lost of family members, there were hard times to rebuild their coastal agriculture. The source of economy was impaired and it sent many families at mercy of the government aid just to survive. Rebuilding the farming business took another five.

A few years before that, the Government decided to establish the embankment of the coastal islands through the predecessor of the Bangladesh Water Development Board (BWDB). The aim was to protect the people and their property from cyclonic surges and create better conditions for agricultural production by reducing intrusion of saline water and improving drainage of rainwater.

The 1970 tragedy opened many eyes including those of the farmers. The embankment has failed and with the latest coverage of Global Warming and rising seas, Bangladesh has been put on the map among the at risk nations. Research were reporting that rural populations and farmland (especially rice) on some coasts will be wiped out. According to the UK Royal Society a one meter sea level rise could flood 17 percent of Bangladesh, displacing tens of millions of people and reducing its rice-farming land by 50 percent.

The Kirans realize that they can no longer rely on the embankment. The situation will worsen and there is no easy way to solve it. The Government has started calling on independent farmers to come forward for a consultation to plan a new farming strategy. At first, the elders of the Kirans are very skeptical of getting outside help but later when they were explained the value of The Food Maker Program, they came to understand that the benefit will for them.

Sanjez Kiran has decided that his family will move away from coastal areas. The plan that was customized to fit his family will assist them in getting a land further in-land where there are large plain areas for him to start growing rice and potatoes. The land has been researched and tested and approved for the crops. Sanjez even managed to secure financing and buyer for the crops even before the seeds were planted. His family and the families of his worker will have a better life with the plan.

Sanjez's brother, Jamil, is more sentimental at heart. Despite persuasion from his wife and kids, he refused to leave the coastal area where his father first planted the seed for their agriculture heritage. Lucky for him, The Food Maker has a strategy that

fits this need. He was allowed to remain on the safer part of the coastal where a wall was built further out towards the sea. This wall became a solid pen for a new adopted farming activity he had option for; fish farming. This met the need for a ready international market. On top of that, Jamil's sister in-law Reha, an aspiring business lady, wanted to fund a floating crops farm which will share the same space as the fish farm. The plan was very convincing that even a lady of little experience was willing to invest on such technology. Reha herself was assisted in the start up of the floating farm, she was able to see the report of potential income which will be generated even before harvest period comes.

System Element		E M S	Disaster Anticipation and Management Program (DAMP)	1
Originator Natrina Toyong	SuperSet Element(s)		Related Elements	
Contributors Gabriel Biller Albert Wang Elisabeth M de Morentin			<ul style="list-style-type: none"> Disaster Safety Zones (DSZ) Rescue Mission Management System (ReMMS) 	
Sources	SubSet Element(s)			
<ul style="list-style-type: none"> http://www.nhc.noaa.gov/aboutsshs.shtml. http://www.fcc.gov/eb/eas/ Y. Gao, V. Freeh and G. Madey, Conceptual Framework for Agent-based Modeling and Simulation, Analysis and modeling of open source software community, submitted to NASOS 2003. 	<ul style="list-style-type: none"> Agent-based modeling & Simulation (ABMS) Public Emergency Alert System (PEAS) Unified Disaster Index System Local Voice Phase Forward Child Registry 			

Description

DAMP is disaster anticipation program which uses agent-based disaster modeling and simulation (ABMS) that synthesizes relevant weather and population information to aid in structured response. The process quickly incorporates dynamic weather data, predicted population actions, and established response plans to clarify the tradeoffs of all options.

System also helps quickly communicate actions to be taken to community medical resources leaders to ensure efficient coordination of evacuation and dynamically identifies appropriate distribution routes and destinations for stockpiled aid resources, at the same time responsible for sending out the first alert to notify all level of public.

Properties

- A disaster anticipation program running at two levels: Central and Local Units.
- A simulation system proactively used to model disaster scenarios
- Agents to prepare emergency plan from the translated simulation result.
- An emergency resource management system.
- An emergency alert system.
- Archives of cases and data.
- A monitoring unit for unusual patterns.
- An archive of past cases and simulation results for reference.
- Proactive collection of emergency solutions at Local Unit level.

Features

- Provides advanced monitoring technology for participating at-risks communities.
- Runs simulations when dangers approach at-risk community
- Clarifies the tradeoffs of all options to guide response plan choices.
- Collaborate efforts at all level within community to prepare for emergency situation.
- Create a comprehensive solution for local context evacuation.
- Provide a credible source and means for alert warning which reaches all communities involved.
- Provide past and new references for adaptable solutions.
- Ease the evacuation process with human level solutions.

Fulfilled Functions

9. Record measurements
10. Monitor exposure
11. Monitor risk
12. Monitor vulnerability
14. Document extreme weather events
28. Assess potential impacts to coastal ecosystems
33. Identify appropriate measures for local environments
37. Convey situation severity to general public
96. Understand warning signs
102. Identify threat
103. Assess the level of risk
135. Conduct ongoing situation assessment
136. Analyze event

Discussion

DAMP is a disaster anticipation program that uses agent-based modeling and simulation (ABMS) that synthesizes relevant weather and population information to aid in structured responses to looming disaster events. The process quickly incorporates dynamic weather data, predicted population actions, and established response plans to clarify the tradeoffs of all options.

A large part of the system deals with preparation before a disaster. The simulation identifies a series of plans based on likely scenarios. Other parts of the system recommend appropriate routes to aid resource stockpile managers and distributors and ensure efficient coordination of evacuation while simultaneously activating the first alert to notify the general public.

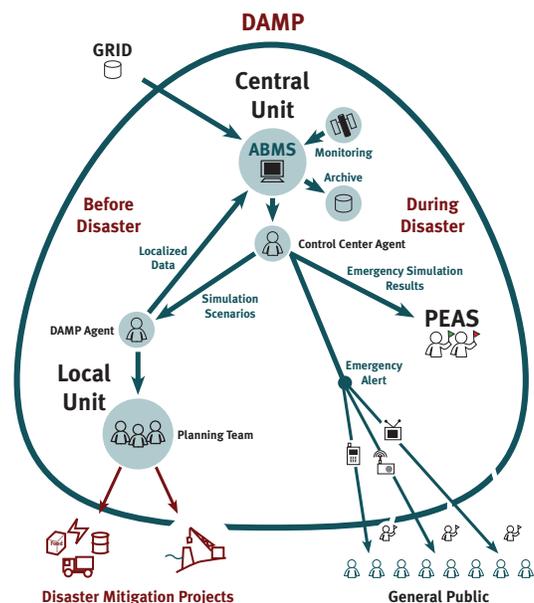
The system's Central Unit houses the expertise to run the ABMS. These experts are responsible for running simulations based on requests from local units and when the monitoring team in the Central Unit detects an unusual weather pattern. Results will be proactively presented to the Local Unit. The liaison between Central and Local unit is headed by Control Center Agent (Central) and Damp Diplomat Agent (Local).

The result of the simulated run will be forwarded to the Damp Diplomat Agent in a form of early data. This data will be translated and re-interpreted by Local Unit Planning team who will gather relevant research to fit the result to a local context. Planning team will release proposals plans befitting different anticipated disaster scenarios. The preparation team will then take the responsibility either to collect, allocate and distribute resources of build structures and artifacts in anticipation of disaster.

Being a member of the Central Unit, weather conditions of Local Unit will be constantly monitored. When an unusual weather pattern is detected, Central Unit will run an emergency simulation to predict what outcome the weather will bring. With the result,

Central will pass the message via the emergency channel and prepare the three pillars of the Alert system; combination of technology and human interaction.

Prior to disaster, a big part of planning consist of understanding local context. This channel brings in Local Voice to assist in determining the best emergency route, safe zone and resources available. A big part of resources requires human power and a voluntary program at a neighborhood level. These people are responsible to coordinate evacuation plans and manage evacuation centers. Preliminary planning of evacuation centers will divide evacuees into small travel groups. Children will be registered to identify if they are separated from their guardian. The teams of evacuees will be moved according to a pre-determined Phase Forward evacuation plan, according to the situation at hand.



Scenario

Sandra realizes that the Central Unit has been giving confirmation of an on-alert signal to the Local Unit that she works with. In the last couple of hours since Central Monitoring Team discovered the unusual wind pattern heading towards their coastland, both Local and Central Unit are busy running through process checks. Central has run an agent based simulation based on local wind patterns. The result was both shocking and comforting at the same time. Shocking because looking out the window, Sandra would never imagine that the beyond the clear sky that she is seeing, is a Category 4 hurricane scheduled to hit the coastland in less than 10 hours. On the other hand, she is relieved because the system has allowed her and her team to start evacuation in time.

Personally Sandra is worried for her family, despite having her 2 year old daughter registered and prepared to evacuate with her mother and others from their assigned evacuation group. Sandra is not able to evacuate with them but she plans to leave in a few hours once the Local Center evacuation orders given out and all plans are in place. She will be able to reunite with them at her assigned evacuation center.

The confirmation of the hurricane came at the same time the public alert was broadcast over all digital channels including all television and radio network. The public has been on-alert at the same time that the news from the Central reached the Local Unit. Now however, it is up to the local unit to implement the pre-outlined plan based on the level of danger. The report shows that the east side of the land will be most at risk. She assigns immediate evacuation priority to major public and private institutions of the area. The Latent Evacuation Guidance Team (LEG Team) of the area have taken their assigned positions and are communicating with Local Unit to help direct evacuees along the appropriate routes.

Sandra runs through the checklist the second time as the emergency enters phase one. By now, all neighboring areas to the at-risk location are slowly being evacuated. Reports show that situation at the safe zone are under control as people have begun slowly arriving in their pre-assigned teams. Even, the Threat Identification and Positioning Team (TIP Team), which consist of members in the general public, has done its part well, members having secured danger zones with the reflective floating device. An aerial capture from the darkening clouds shows some lowland and industrial sites being marked off as danger zones.

Two hours before the hurricane was scheduled to hit, the Local Unit Team are evacuated in a Mobile Remote Center Van. This allows them to still keep in contact with other evacuation centers. Sandra is not assigned to be at the mobile control center so she was transported to her assigned relief center according to plan.

Registering herself at the communication center, she was easily reunited with her group and family.

The whole event during evacuation was unlike what she had experienced as a child. Living in flood prone area, she lost a brother to in that tragic event 20 years ago. This calm and systematic evacuation helped maintain the faith and morale of all evacuees, including herself. Like the others, she is deeply saddened by the lost of her home and the thought of rebuilding her life again, but she has a lot to be thankful for. Seeing all the people working in groups and evacuating in shifts, brings pride to her heart because no lives were lost.