Flooding and Climatic Changes: 
The Greatest Threats in the History of the World

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Abstract

Asia has more than its share of natural disasters and man made conflicts. The world’s most diverse continent – setting side by side huge modern cities with fragile squatter and refugee settlements – is victim to huge geographical span, ranging from sub-Arctic wastelands to tropical rain forests, empty deserts, deep oceans, shallow flood basins. Thousands of people are killed by our weather every year and each country has its litany of drought and flood burdens, but one thing is certain: the dramatic changes in the world’s weather patterns are making the world in general and Asia in particular especially vulnerable.

Keywords: Pro-greenhouse effect theory, anti-greenhouse effect theory, El Niño and La Niña weather changes, large-scale deforestation, doomsday prediction, artesian wells, flood barrier, drought.

Introduction

Floods in the city of Hat Yai, droughts in North and South Korea (Anon. 2001c), storms in the Philippines, rogue El Niño and La Niña currents, uncontrollable forest fires in Indonesia, the litany of global natural disasters goes on and on, but one thing is certain; the overall weather pattern is changing, and with it, Asia’s 21st century economic prospects and lifestyle.

Many scientists blame the weather turnaround on the “Greenhouse Effect” - global warming theory resulting from the accumulation of carbon dioxide, chlorofluoro carbons and other industrial gases suspected of depleting the Earth’s ultraviolet blocking ozone layer.

Pro-Greenhouse Effect theory scientists fear huge gaps have already appeared in the ozone layer above the North and South poles, and predict mean temperatures to rise a degree or two celsius by 2030. This man-made breakdown of a part of the Earth’s atmosphere will also create stormy weather (Dikkenberg 1991).

However, other scientists deny a Greenhouse Effect exists. They claim we are going through, a natural cycle of weather changes (Avery 1999).

Another science lobby believes that the El Niña and La Niña water currents off the American Pacific coast are the real ogres in the changing world map (Ola and D’Aulaire1998).

The UN urged Asian and Pacific countries to do more to prevent large-scale deforestation. It said, “Changes in vegetation will have a profound effect on food production and natural habitats, temperatures and rainfall will change”

According to the Bangkok Metropolitan Administration, there is an additional factor for Bangkok’s flooding anxiety. Like Venice in Italy, the city is slowly sinking.

The twin problems of flooding and climatic changes are the greatest threats in the history of the world, making Asia especially vulnerable.

Scope and Objectives
The scope of this paper is limited to flooding and climatic changes. The range of this study is listed below:

- **Pro-greenhouse effect – global warming theory.**
- **Anti-greenhouse effect theory – rise and fall in temperature are natural cyclical pattern of weather changes.**
- **El Niño and La Niña: Unusual weather changes theory.**
- **Cause and effect of large-scale deforestation: Nature strikes back.**
- **Like Venice in Italy, Bangkok is slowly sinking.**
- **Bangkok fighting the doomsday prediction with improved drainage and flood barrier protection system.**
- **Drought and war in Afghanistan: the world’s worst humanitarian crisis.**

**Pro-Greenhouse Effect: Global Warming Theory**

We are all too familiar with the theories of global warming; the pollution released by the combustion of fossil fuels being a cause of it, and the melting of ice caps flooding land misses from Bangkok to Bangladesh being the catastrophic consequences. So much so that when President George W. Bush rejected the Kyoto Treaty earlier this year, the developed world was left stunned. Green activists accused him of being in the pay of large oil corporations and inconsiderate of the rest of the world (Lam 2001).

In August 2001, two dozen lawyers from across the US, representing groups like Greenpeace, the World Wildlife Fund, and the Natural Resources Defense Council, met to explore novel legal strategies to adopt against global warming, posing serious risks to entire nations.

The discussion at the lawyers’ strategy session was based in part on work by Andrew Strauss, a professor of international law at Widener University’s School of Law in the State of Delaware (Seelye 2001). Mr. Strauss was recently asked by the New Economics Foundation, an environmental research group in London, to examine the possibility of poorer countries seeking compensation from wealthier ones for refusing to go along with the Kyoto Protocol, the internationally-negotiated framework for reducing greenhouse emissions.

Suits could be brought, for example, on behalf of Tuvalu, a tiny nine-island nation in the South Pacific. Tuvalu is home to some 10,000 people, and scientists say could vanish within 50 years because of rising sea levels caused by the earth’s warming.

Plaintiffs could also include residents of other island nations like the Maldives or Jamaica, or the Netherlands, where the land is not much above sea level. They might include the frail elderly, whose health is particularly at risk on very hot days.

Defendants could be US federal agencies like the Environmental Protection Agency or the Energy Department. Spokesmen for the federal agencies are saying the idea is hypothetical. Privately, they suggested that a defense could include there were no binding laws regulating the global warming *per se* and various plaintiffs had no legal standing.

Mr. Dan Esty, Professor of Environmental Law and Policy at Yale Law School however said, “In some circumstances, legal actions are evaluated or pursued not with expectations of success in court, but recognizing that real victory would be in the Court of Public Opinion” (Seelye 2001).

**Anti-Greenhouse Effect Theory**

During the peak of the last ice age, about 18,000 to 20,000 years ago, the ice sheets at the North and South poles were much larger than today. With much of the water frozen up, the sea level was so low that most of Southeast Asia dried up as one same landmass.

Later as the global temperature began to pick up, the ice started melting and the sea level gradually rose until Borneo and the rest of Indonesia became islands once again.
The water hit its maximum level around 6,500 to 7,300 years ago when the sea covered much of the present Chao Phraya Delta, all the way to north of Ayutthaya. Bangkok, of course, was several meters underwater.

From that time on, the sea began to recede until the shoreline became about the way it is today (Kungsawanich 2001).

According to the past pattern of previous ice ages and the warmer periods between them, global temperatures now are supposed to be cooling down and sea water receding. Instead, what actually has been happening over the past few decades is that temperatures seem to be rising again (Kungsawanich 2001).

Although Bush’s decision to abandon the Kyoto Treaty was to protect his nation’s economy, it caused people to question the Kyoto Treaty, and ultimately sparked a view which speculated about the credibility of the Global Warming Theory.

Scientists previously in favor of the skeptical view felt more confident to speak out, such as Ronald Stouffer of the Geophysical Fluid Dynamics Laboratory at Princeton (Lam 2001). Stouffer said, far from global warming, Europe might actually be in danger of entering another ice age.

**Ice Age Aftermath**

What evidence is there that we are heating earth? Take a look at the facts: since 1880, the globe has warmed up by almost 1°C. But this is simply following a mini Ice Age that enveloped the earth for eight centuries before that. Therefore, the warming is probably just part of the Earth’s natural cyclical pattern, not necessarily increased levels of carbon dioxide (Lam 2001).

Though some scientists insist there is a cause for alarm evidence indicates otherwise. Global warming may be coming, but if it does, it may not be extreme. And it might actually be a boon for the environment.

Present researchers say that the earth is likely to warm up by about one-and-half degrees Celsius during the next century (Avery 1999).

The world has experienced approximately that much warming fairly recently in history. Between AD 900 and 1300, the earth warmed by about one-and-a-half degrees Celsius, according to the Oregon Institute of Science and Medicine. Scholars refer to that period – one of the most favorable in human history – as the Medieval Climate Optimum (Avery 1999).

Food production surged, many scientists believe, because winters (in Europe) were milder and growing season longer. Key agricultural regions experienced fewer floods and droughts (Avery 1999). In the 12th Century people had vineyards in England. The temperature was 2°C higher than now (Lam 2001).

Prosperity stimulated an outpouring of creativity – in architecture, art, and practical invention. In Europe artisans built the soaring cathedrals that even today stun tourists with their beauty and engineering excellence.

In North America, the Anasazi civilization grew abundant irrigated crops – and then vanished when the Medieval Optimum ended and rainfall declined (Avery 1999).

There were negatives, of course. The steppes (lowlands) of Asia and parts of California, for instance, suffered dry periods (Avery 1999).

“Rice growth declined sharply when the temperature reached 35°C”, the United States Environmental Protection Agency (USEPA) said (Dikkenberg et al. 1990). New studies indicate that yields could fall by as much as 10% for a 1°C rise in areas such as the tropics (Anon. 2001 g).

**El Niño and La Niña:**

**Unusual Weather Changes Theory**

Another science lobby believes that the *El Niño* warm-water current off the American Pacific Coast triggers hot and dry summers, while the *La Niña* triggers more frequent and intense tropical downpour in Southeast Asia.

*El Niño* and *La Niña* weather changes are part of a seesawing of winds and currents in the equatorial Pacific as the result of Global Warming (Ola and D’Aulaire 1998).
What can we expect of El Niño?

In Southeast Asia warm water piles up along the coasts of Indonesia, Australia, and the Philippines, raising sea level more than 30 cm above the South American side of the Pacific.

For example, the El Niño that pounded the globe during the summer of 1997 was by some measure the most powerful and devastating of the last century. Droughts struck Indonesia, Malaysia, Thailand, and the Philippines, causing extreme water shortages and wiping out crops.

Fires, fueled by dry vegetation, destroyed some five million acres of Indonesian forest, blanketing the Indonesian Islands, Singapore, and Malaysia in smoke and haze (Ola and D’Aulaire 1998).

What can we expect of La Niña?

Southeast Asia will get lots of rain - lots of it. The biggest problem, says a hydrologist at Universiti Sains Malaysia, is that La Niña coincides with the November-to-March monsoon season (Ola and D’Aulaire 1998).

For example, when the moist air rises, and the atmospheric pressure decreases, it triggers more frequent and intense tropical downpours in Southeast Asia, like the flooding of the whole city of Hat Yai, Thailand in the year 2000 (Chomchalow 2000).

Cause and Effect of Large-Scale Deforestation: Nature Strikes Back

The devastating flood which struck Phrae’s Wang Chin District in the early hours of 4 May 2001, leaving more than 30 people dead and causing several million Baht in property damage, appeared at first to be just another natural disaster. The District had suffered torrential rains for two days - 67.7 mm on the first day and 285.5 mm the next, thought to be the heaviest falls in 80 years. Two creeks, Nam Soi and Nam Phung, overflowed, sending a torrent of water rushing downstream. Most of the houses along the banks of the creeks were washed away along with their occupants, most of them still asleep.

These are the superficial facts. A closer look reveals this tragedy was not caused wholly by the forces of nature; it was as much the result of man’s rape of the forests. Many of the flood victims themselves were partly to blame for their direct involvement in illegal logging or for their complete indifference to the destruction of forests, natural soaks which could have absorbed the heavy downpours of the previous days.

Phrae has a long reputation for forest encroachment. It is said that in some villages every single person is involved in illegal logging or related activities.

All the assistance for rebuilding their communities will be pointless if the local people, especially those still engaged in illegal logging are not told in the most no-nonsense terms to stop what they are doing.

Making people whose livelihoods have evolved around illegal logging for decades to change their habits will not be easy. Alternative work will have to be found so villagers can make a similar living.

This flood should serve as a valuable lesson to the people of Wang Chin and people everywhere living beside forests that their poaching can have the most disastrous results. Unless they change their attitudes and appreciate the value of the forests, it could only be a matter of time before they all fall victim to a similar catastrophe (Anon. 2001a).

Bangkok is Slowly Sinking

According to the Bangkok Metropolitan Administration, there is an additional factor for Bangkok’s flood anxiety. Like Venice in Italy, the city is slowly sinking (Dikkenberg 1990).

A plan to spend Baht 2.5 billion to pump water underground in a bid to stop land subsidence in Bangkok and six surrounding provinces was approved by the previous government.

The plan has now been scrapped by the present administration. It was considered a waste of time and money because of the widespread
illegal use of artesian water, which is one cause of land subsidence (Praiwan 2001).

The problem is simply ‘people’ - our increasing numbers and our flagrant abuse of one of our most precious, and limited, water resources (Graves 1993).

**Improved Drainage and Flood Barrier Protection System**

The city is building more tunnels to drain off floodwater under an action plan to prevent flooding.

A project to build dykes along both sides of the Chao Phraya River, meanwhile, continues apace.

According to a Deputy Bangkok Governor, “The existing sewers, capable of draining rainwater at no more than 60 mm an hour, have already reached their capacity, hence the need to look for new drainage.”

Building tunnels is preferable to rebuilding sewers that required excavation of streets.

Among vulnerable areas were Phahonyothin and Sukhumvit Roads where drains and pumping stations are being built.

Water in sewers at Phahonyothin 11 and Pradiphat Roads as well as Soi Ari Samphan would be pumped into Phibun Watthana pond, an 8-rai (6.25 rai = 1 ha) temporary storage area, before being taken by a pumping station to Khlong Prem Prachakon. From there, another pumping station would take the water through a 3.40 m-wide tunnel to the Chao Phraya River to remove water more rapidly.

A similar process was underway at Sukhumvit 26, 36, and 42, where pumping stations would drain water into Khlong Toei, where another pumping station would send it to the river.

The new tunnels at Soi Ari Samphan and Sukhumvit 42 would be finished by the end of the year. These are in addition to two existing ones at Sukhumvit 26 and 36.

The Bangkok Metropolitan Administration is spending Baht 3.6 billion to build a wall along the Chao Phraya River and canals to contain rising waters over 38.40 km$^2$ of the city prone to flooding. A 33.48 km stretch is already completed, a further 4.87 km is underway, and another 38.28 km is awaiting the signing of the construction contract, for a total of 76.63 km. A further 5.66 km is planned pending funding (Wangvipula 2001).

The 83 km-long embankment, hailed as an effective anti-flood measure for 45,000 houses on the river’s banks, would likely be complete by 2004.

Meanwhile, according to the spokesman of the Bangkok Metropolitan Administration’s Drainage and Sewerage Division, 1.5 million sacks of sand are available and ready to block possible overflows from the Chao Phraya River.

Also, the Director-General of the Royal Irrigation Department whose agency closely cooperated with the meteorological counterpart on the flood-prevention scheme, was also confident that the situation can be controlled (Lim 2001).

**Drought and War in Afghanistan: The World’s Worst Humanitarian Crisis**

As many as 100,000 Afghan children could die this winter unless food reaches them in sufficient quantities over the next six weeks, the United Nations International Children Fund (UNICEF) warned on 15 October 2001.

A United Nations High Commission for Refugees (UNHCR) spokesman said 1,000 refugees were crossing the southeastern Afghanistan, the UN Secretary-General Kofi Annan asked on 26 September 2001 for $584 million to aid Afghanistan facing what the United Nations calls the world’s worst humanitarian crisis (Anon. 2000 e).

The UNHCR said the extremely tight Security imposed between Kandahar in Afghanistan and Quetta in Pakistan had curtailed the ability of Non-Governmental Organizations (NGOs) to complete emergency preparation for the refugees.
Just a few foreign NGOs have managed to establish operations, including US-based ‘Save the Children’ and British charity, ‘Oxfam’.

‘Oxfam’ is responsible for identifying potential sites for refugee camps. However, an ‘Oxfam’ spokesman said the search continued to be hampered by chronic water shortage brought on by the worst drought in more than three decades. ‘Oxfam’ had discovered that water levels in the border town of Chaman in Quetta did not meet expectations, which had been identified initially as an ideal resettlement site.

It will take about three months to drill enough artesian wells to meet refugee water needs if needed in an emergency situation (Anon. 2001f).

Water is essential for life. Every person requires 2.5 L of fresh water/day simply to maintain the biological processes (Henderson-Sellers 1979).

Conclusion

As a result of rigorous scientific analysis by some of the world’s most distinguished climatologists, unless nations resolve to develop a plan to reduce the production of greenhouse gases caused by the industrial revolution, global warming is likely to trigger a cascade of unpleasant effects.

Global warming will cause sea levels to rise (the two Poles hold 90% of the Earth’s water), with a dire “flow-on” to Asia which is home to three billion of the world’s population (Dikkenberg 1990). If no action is taken by about 2050, the world’s temperature will have increased by 1.4°C. In Africa, the coastline of Cairo to Lagos is completely flooded. In Asia, Bangladesh is almost totally inundated and the East Indies have been reduced to a few scrappy islands. Tens of millions stand on the brink of death (Anon. 2001b).

Bangkok will perish if the waters from the greenhouse effect rise 20 cm. A large part of the Thai capital will turn into a lake, stopping traffic and shutting down much of the nation’s infrastructure. A rise of 1.4 m would inundate Thailand’s rich rice belt along the fertile shores of the Gulf of Thailand.

Thailand was named, along with Indonesia – particularly Java, Pakistan, Bangla-desh and several African countries, including Egypt and Senegal, as one of the ten countries most vulnerable to the greenhouse effect, according to a special report published by the United Nations Environment Programme (UNEP).

Scientists and water control experts from 19 countries, including Australia, France, and the US, who met in the 1.5 m Marshall Island in July 1990, were another group which named Thailand and Indonesia as high-risk danger zones in an Asian/Pacific sea water rise (Dikkenberg 1990).

The most recent Intergovernmental Panel on Climate Change (IPCC) points out in its recent “Climate Change 2001 Report: Global Warming” is likely to trigger a cascade of unpleasant effects: Elderly people will suffer and die in smoggy, polluted cities; crops will fail; wildlife and livestock will perish on a scorched planet (Anon. 2001b).

That report was the combined work of several thousand of the world’s leading meteorological experts. The report, which was the basis of the Kyoto Treaty, told us that the world’s sea level had risen 10-25 cm during the 20th Century, and will rise by a further 1 m within the next 100 years (Lam 2001).

The developed world was left stunned when President George W. Bush rejected the Kyoto Treaty in March 2001. Bush opposed the pact, signed by former President Bill Clinton in 1998, but never introduced in the Senate, because he thinks the economic costs outweigh the benefits; it sparked a view among ordinary people which speculated about the credibility of the Global Warming Theory (Lam 2001).

On 20 May 2001, the UN Secretary-General Kofi Annan criticized President Bush’s decision. “This is not some distant, worst-case scenario. It is sober prediction, based on the best science available,” he said.

In order for the Treaty to come to effect, it needs the backing of 55% of industrial states ranked according to the level of carbon dioxide emissions.

The Executive Secretary of the Secretariat of the UN Framework Convention on Climate Change urged industrial states to ratify the Kyoto Treaty on Global Warming in 2001 and leave
Washington to join in 2013 when the next phase of the Kyoto Protocol was due to come into force.

There are many strategies for curbing greenhouse-gas emission without slowing economic growth. In fact, the spread of advanced, cleaner technology is more of an economic opportunity than a peril.

**Economic and Social Aspects of Rising Oceans**

Any rise in sea level will affect two base Asian survival mechanisms: agriculture and employment. Eighty percent of the continent’s people work on the land (Dikkenberg 1990).

During the last climate conference held in Marrakesh, Morocco in November 2001, the UNEP has warned that harvests of the world’s key crops could drop by up to 30% in the next 100 years due to Global Warming.

The report said scientists had found “evidence that rising temperatures, linked with emissions of greenhouse gases, can damage the ability of vital crops such as wheat, rice, and maize”. New studies indicate that yields could fall by as much as 10% for a 1°C rise in areas such as the tropics.

According to the Intergovernmental Panel on Climate Change (IPCC), the UN team of scientists, current climate models predict a Global Warming of about 1.4 to 5.8°C between 1990 and 2100.

“Billions of people across the tropics depend on crops such as rice, maize, and wheat for their survival, the report quoted an Executive Director of UNEP as saying: “These new findings indicate that large numbers are facing acute hunger and malnutrition unless the world acts to reduce emissions of carbon dioxide and other greenhouse gases” (Anon. 2001g).

**Understanding the Prediction**

Our world is so complex it is immensely difficult to predict what will happen next. The predictions spelling the doom of the Maldives and the rest of the world are only predictions.

But all of this just demonstrates the force of global warming. Global warming, after all, is only a theory. A theory in the words of the top British scientist Stephen Hawking, Lucasian Professor of Mathematics at Cambridge University, “is always provisional… you can never prove it (Lam 2001). No matter how many experiments agree with the theory, you can never be sure that the next time the result will not contradict the theory”.

Are the true causes beyond our control? Don’t let hypothetical threats make you forget real, everyday risks.

**References**

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