Memorandum on China's Measures for Addressing Sea Level Change

ZHANG Zhongmin[1]

June 2011

Table of Contents

[1] ZHANG Zhongmin, Assistant Professor at the Environmental & Resource Law Institute of Zhongnan University of Economics and Law, PRC. lawzzm@gmail.com.

Foreword

This memorandum describes China's recognition of the need to address sea level change. This memo is also an analysis of official state measures for addressing sea level change as well as unofficial perspectives on the topic from other segments of Chinese society.

China's National Climate Change Programme (2007) was a milestone in China's march towards addressing climate change. Over the past 4 years, more and more official reports, projects, meetings, and programs have emerged. Several of these major documents are highlighted in this memo because they represent a centralized expression of China's official state position. Combined with unofficial and informal sources, these official state documents allow for a comparative, systematic reflection of the Chinese position on sea level change.

Note that this memo does not deny the differences between formal State documents and informal sources, but rather asserts that only by integrating the formal and the informal can the real problems be appreciated.

1. Recognition of Sea Level Change

1.1 Recognition of Sea Level Change in Key State Documents

1.1.1 China's National Climate Change Programme (2007)[2]

The following excerpts are from the official translation of the document.

> The rate of sea level rise along China's coasts during the past 50 years was 2.5 mm/a, slightly higher than the global average… China has a continental coastline extending over 18,000 kilometers and an adjacent sea area of 4.73 million square kilometers, as well as more than 6,500 islands over 500 square meters. As such, China is vulnerable to the impacts of sea level rise.
>
> .
>
> .
>
> .
>
> Climate change has brought certain impacts on the coastal environment and ecosystems of China in some extent, mainly represented by the accelerating trend of sea level rise along the Chinese coast in the past 50 years, which resulted in coastal erosion and seawater intrusion, as well as mangrove and coral reef degradation. The future climate change will have even greater impact on the sea level and coastal ecosystems of China. Firstly, the sea level along the Chinese coast will continue to rise. Secondly, the frequency of typhoon and storm surge will increase, aggravating the hazards induced by coastal erosion. Thirdly, some typical marine ecosystems, including coastal wetlands, mangroves and coral reefs, will be further damaged.
>
> .
>
> .
>
> .
>
> The coastal regions in China are characterized by dense population and most active economic activities. Since most of these coastal areas are low and flat, they are vulnerable to marine disasters caused by sea level rise. At present, China clearly lacks capacity in marine environment monitoring, resulting in insufficient capacity of early warning and emergency response to ocean disasters associated with climate change. Lower standards for coastal anti-tide engineering also weaken the ability to resist ocean disasters. In the future, coastal erosion, seawater intrusion, soil salinization and back flow of seawater into the river estuaries caused by sea level rise will be among

[2] This document was prepared under the auspices of the National Development and Reform Commission, and was printed in June 2007.

realistic challenges in coping with climate change in China's coastal areas. [sic]

1.1.2 Special Sci-Tech Campaign to Cope with Climate Change (2007)[3]

The following excerpt has been translated from the original Chinese. "Sea levels continue to rise, which threatens coastal economies and peoples."

1.1.3 2007 China Sea Level Communiqué[4]

The following excerpts have been translated from the original Chinese.

> The results of inspections and analysis indicate that: the average rate of sea level rise along China's coasts has been 2.5 mm per year, slightly higher than the global average; during the past 30 years, China's coastal sea level has risen by 90 mm with Tianjin's coastal sea level rise heading the pack with an increase of 196 mm; in 2007, China's sea level was, on average, higher than normal due to the effects of climate change; and during several months, sea level is higher than average, for example in areas such as the northern coastal area during March and September and the southern coastal area during March and November.
>
> .
>
> .
>
> .
>
> In 2007, climate change and sea level rise continue to affect coastal populations, economies, ecosystems and environments. In addition, abnormal climate events occur frequently during periods of seasonally high sea levels and during the astronomical spring tide, greatly influencing industry, agriculture and people's daily lives. According to the outcomes of sea level forecast models, China's coastal sea level will rise 32 mm above 2007 levels in the next 10 years.

[3] This document was issued jointly by the Ministry of Science and Technology, the National Development and Reform Commission, the Ministry of Foreign Affairs, the Ministry of Education, the Ministry of Finance, the Ministry of Water Resources, the Ministry of Agriculture, the Ministry of Environmental Protection, the State Forestry Administration, the Chinese Academy of Sciences, the China Meteorological Administration, the National Natural Science Foundation, the State Oceanic Administration, and the China Association for Science and Technology in June 2007.

[4] This communiqué was issued by the State Ocean Administration in January 2008.

1.1.4 2008 China Sea Level Communiqué[5]

The following excerpts have been translated from the original Chinese.

> Over the past 30 years, the trends in China's coastal sea levels can be best described as fluctuating but rising; the average rate of increase was 2.6 mm/year, higher than the global average. In 2008, coastal sea levels were the highest of the past 10 years: 60 mm higher than normal levels and 14 mm higher than in 2007. Regionally, southern coasts experience rising more rapidly and to a greater extent than the northern coasts; temporally, sea level in February is comparatively low while the levels from April to June are much higher. Against the backdrop of global sea level rising caused by global warming, regional sea floor sedimentation and abnormal weather events were the primary reasons for China's coastal sea level change in 2008.
>
> .
>
> .
>
> .
>
> Sea level rise accelerates storm surges, coastal erosion, saltwater intrusion, soil salinization, salt tides, and other ocean disasters, while also affecting coastal public drainage facilities to varying degrees.
>
> .
>
> .
>
> .
>
> It is predicted that China's coastal sea levels will rise 80-130 mm above 2008 levels over the next 30 years. The Yangtze delta, Zhujiang delta, Yellow River delta and Tianjin coast would continue to be major fragile zones with respect to sea level rise.

1.1.5 China's Policies and Actions for Addressing Climate Change (2008)[6]

The following excerpts are from the official translation of the document.

> In China's coastal zones, the sea surface temperature and sea level have risen by 0.9 degree Celsius and 90 mm respectively, over the past 30 years… With a coastline over 18,000 km long, China is vulnerable to the adverse effects of sea level rises.
>
> .
>
> .

[5] This communiqué was issued by the State Ocean Administration in January 2009.
[6] This document was issued by the Information Office of the State Council in October 2008.

.

The past 30 years have witnessed in China an accelerating trend of sea level rise, which has caused seawater intrusion, soil salinization and coastal erosion, damaged the typical marine ecosystems of coastal wetlands, mangrove swamps and coral reefs, and diminished the service functions and bio-diversity of coastal zones. Sea temperature rise and seawater acidification resulting from climate change have given rise to a lack of oxygen in some maritime areas, the degradation of marine fishing resources and the survival of rare and endangered species.

It is predicted that the sea level in the coastal zones of China will continue to rise. Sea level rise will undermine the capacity of public drainage facilities in coastal cities, and impair the functions of harbors. [sic]

1.1.6 2009 China Sea level Communiqué[7]

The following excerpts have been translated from the original Chinese.

Inspections and analyses indicate that over the past 30 years, trends in China's coastal sea level could be best described as fluctuating but rising; the average rate of increase was 2.6 mm/year, higher than the global average.

.

.

.

In 2009, China's coastal sea levels were the highest of the past 30 years; levels were 68 mm above normal levels and 8 mm higher than in 2008. The regional and temporal differences in the coastal sea level change brought about by climate change include greater increases in the south than in the north with northern sea levels in February and southern sea levels in September reaching their highest levels in modern history during the past 30 years.

.

.

.

In 2009, against the backdrop of global climate change and persistent sea level rise, Liaoning's, Hebei's and Shandong's coasts were severely impacted by saltwater intrusion, accelerating the salt tide problems of the Yangtze river and the Zhujiang estuary. Moreover, sea level rise aggravates the influence of coastal storm surge, and affects local sustainable development in addition to people's daily lives.

.

.

[7] This communiqué was issued by the State Ocean Administration in January 2010.

.

It is predicted that China's sea level will rise to 80-130 mm above 2009 levels in the next 30 years. Coastal government at every level should pay close attention to these changes and their relevant effects.

1.1.7 China's Policies and Actions for Addressing Climate Change - The Progress Report 2009[8]

The following excerpts are from the official translation of the document. "Along China's coast, sea level rose to its 10-year high, 60mm above the normal level."

1.2 Recognition of Sea Level Rise in "Real" Society[9]

1.2.1 Academia

Using volume of publication as a measure, recognition of sea level rise, or at least a general attitude and research interest in the topic, can be described to some extent. Using the China Knowledge Resource Integrated Database, some relevant records and statistics may be acquired. [10] Searching for "Sea Level" and limiting the search to 2007-2010 reveals 203 papers records including 197 natural science papers and 4 social science papers. Using Climate Change as the search phrase, again limiting the search to 2007-2010, reveals 4039 papers including 3510 natural science papers and 529 social science papers. 57 of the social science papers dealt

[8] This document was issued by the National Development and Reform Commission in November 2009.

[9] Herein, "real" society includes non-national-level government, unwritten sources, and unofficial and folk phenomenon. The difference between the government and nongovernment, officials and the common people, the theory and practice, etc, are thus highlighted in the Chinese context. Of course, these categories are not distinct and may overlap. However, the point is that we can conduct analysis with reference to these key categories because they are typical.

[10] This is the biggest academic database in China, www.cnki.net.

with the law.

According to the database, there are in total 18,406,585 records from 2007 to 2010. Thus, Sea Level and Climate Change comprise 0.0011029% and 0.0219432% of all papers in the database, respectively.

1.2.2 Local Government[11]

Generally, recognition of sea level change by local governments might be found in the opinions of local leaders and in official documents. Thus far, there has been little specific recognition from local governments concerning sea level change. There has, however, been some acknowledgment of climate change more generally.

In June of 2008, China launched a series of provincial programs to address climate change. As of December of 2010, 31 provinces, autonomous regions, and municipalities directly under the control of the central government as well as the production and construction corps of Xinjiang have completed the drafting and legislation of provincial programs addressing climate change; most of these programs have begun to be implemented.[12] In the legislative arena, Qinghai, Ningxia and Anhui are leading the other provinces.

[11] Strictly speaking, local governments are not part of "real" society because they are official and formal. But on the issue of sea level change, especially given that many key documents are promulgated from the central government, local governments are not always in accord with the central government. Moreover, we must recognize that conflicts of interest between not only local and central governments, but also among the local governments. Thus, we consider local governments with "real" society so as not to exclude relevant information.

[12] See China's local governments begin to legislate on climate change, http://www.ah.xinhuanet.com/news/2010-10/08/content_21066611.htm.

1.2.3 NGOs

In recent history, there have been no particular actions or expressions of interest from NGOs on the topic of sea level change. Putting aside international NGOs, domestic NGOs, including grassroots NGOs, have primarily focused their attention on climate change rather than sea level change specifically. [13] For example, Friends of Nature, Global Village, Green Earth Volunteers, Institute of Public and Environmental Affairs, etc, organized the Group of Addressing Climate Change of China's Civil Society, and promulgated the Standpoint of Addressing Climate Change of China's Civil Society (2009) in November 2009, which was based on data on people's opinions collected through investigations, polls, symposia, etc.

1.2.4 The General Public

There does not seem to be any organized expression of opinion regarding sea level change on any Chinese websites. There is, however, some information concerning climate change more generally.

From August to September 2009, the Horizon Group of Investigation and Consultation conducted a study under the heading "Investigation on Public Consciousness of Climate Change." [14][15] The investigation revealed the following.

[13] In China, there are many official NGOs to be distinguished from grassroots NGOs that do not have official backing.

[14] The Horizon Group of Investigation and Consultation is a leading company specializing in professional investigation and consultation. The statistic mentioned can be found at www.horizonkey.com.

[15] This investigation uses multi-phase random sampling. The dataset includes 3785 residents aged 18-60 from large prefecture level cities, Beijing, Shanghai, Guangzhou, Wuhan, Chengdu, Shenyang, Xi'an, as well smaller cities and their surrounding areas (Zhuji in Shaoxing, Zhejiang, Changle in Fuzhou, Fujian, Dengta in Liaoyang, Liaoning, Xinji in Shijiazhuang, Hebei, Linxiang in Yueyang, Hunan, Pengzhou in Chengdu, Sichuan, Xingping in Xianyang, Shaanxi). The sample included 2662

1) When asked what specific environmental problems needed to be solved urgently, people mentioned, in order of decreasing magnitude, air quality (58.3%), garbage disposal (57.2%), and sewage treatment (52.7%). Climate Change, which only 33.5% of people mentioned, came in fourth. 2) When asked who should be responsible for addressing climate change, people mentioned, in order of decreasing frequency, the central government (72.3%), NGOs (9.7%), corporations (7.5%), and the general public (6.2%). 3) When asked who the most credible source of information was, people mentioned, in order of decreasing frequency, the central government (61.5%), NGOs (13.2%), the Media (9.5%), Official Institutes (8%), corporations (5.1%), and scholars (1.8%).

2. Policies, actions and suggestions for addressing sea level change

2.1 Policies, Actions and Suggestions for Addressing Sea Level Change in Key State Documents[16]

2.1.1 China's National Climate Change Programme (2007)

The following excerpts are from the official translation of the document.

> Other key projects related to climate change were also conducted, including China's Climate, Sea Level Change and Their Trend and Impact.[17]

---

citizens from 1123 townships. The final statistic is weighted according to the local real population, with a confidence level of 95% and a margin of error of ±0.92%.

[16] Herein, the key documents are not exactly the ones mentioned in Section 1.1. China's Sea Level Communiqué (2007) has been removed and China's Policies and Actions for Addressing Climate Change (2010) has been added, because there is no content related to the policies, actions and suggestions for addressing sea level change in the former, while there is no content regarding the recognition of sea level change in the latter.

[17] This paragraph belongs to a section titled "Climate Change and Corresponding Efforts in China of the program".

.
.
.

By 2010, the construction and expansion of mangroves will be realized, the capability to resist marine disasters will be raised remarkably, and the social influence and economic losses caused by sea level rise will be reduced in maximum through scientific monitoring of sea level change and regulation of the ecosystem of marine and coastal zone areas and through taking the measures of rationally exploiting the coastline and coastal wetland and construction of coastal shelterbelt system.[18]

.
.
.

Improve the capability in marine environmental monitoring and early-warning. Set up more observation sites and networks in coastal areas and on islands. Construct high-tech observation systems. Improve the capability of aerial remote sensing and telemetering of marine environments, especially capability of monitoring sea level change. Build early-warning and response system for tidal disasters in coastal areas. Promote comprehensive supporting capability of early-warning, strengthen service capability of early-warning systems and capability of production and distribution of early-warning products to increase the capability for early-warning against marine disasters.

Strength adaptation strategies to address sea level rise. Adopt measures of combining slop protection with shore protection, combining engineering measures with biological measures. Raise design standards of sea dike height, heighten and consolidate existing sea dike engineering works to enhance the capacity of dealing with sea level rise. Prevent over exploitation of groundwater and land subsidence in coastal areas, by taking measures of artificial groundwater recharge in the areas where groundwater funnel and land subsidence occurred. Take countermeasures such as using fresh water from rivers or reservoirs to dilute and restrain brackish water against sea water intrusion in the estuaries. Raise protection standard for coastal cities and major projects, raise standard for designed height of part docks, and adjust outlet depth. Make efforts to construct coastal shelterbelt systems with multi-species, multi-layer, and multi-function of forests.[19] [sic]

[18] This paragraph belongs a part titled "Objectives of China to Address Climate Change of the program."

[19] The above two paragraphs belong to a part titled "China's Policies and Measures to Address Climate Change of the program."

2.1.2 China's Special Technology Actions for Addressing Climate Change (2007)

The following excerpt has been translated from the original Chinese.

> Cost-benefits analyses of response strategies for areas most vulnerable to sea level rise have been made. [The major task is thus] to study coastal sea level variations. Using all possible means, we must strengthen Science and Technology infrastructure including climate monitoring systems and observational networks for agriculture, water resources, sea level rise, ecological systems, and etc.

2.1.3 China's Sea Level Communiqué (2008)

The following excerpt has been translated from the original Chinese.

> In order to mitigate and limit the influence of sea level rise, the following measures are suggested:
>
> (1) Coastal governments at all levels are to enhance monitoring, prediction and effect-assessment of sea level rise, and to use the effects of sea level rise as a key factor in coastal plans for social and economical development.
>
> (2) [The Central Government should] continue to control groundwater exploitation, construct and perfect water conservancy, regulate fresh water sources, and effectively control ground sedimentation.
>
> (3) [The Central Government shall] improve design standards for coastal sea walls, and reinforce the construction, safeguard and management of vulnerable areas influenced by sea level rise.
>
> (4) [The Central Government should] strengthen efforts to renew and reconstruct ecosystems such as coastal wetlands, mangrove forests, coral reefs, etc, as well protect coastal ecological resources if it is to provide a solid basis for addressing sea level change.

2.1.4 China's Policies and Actions for Addressing Climate Change (2008)

The following excerpts are from the official translation of the document.

> Through scientifically monitoring the trend of sea level change, controlling marine and coastal ecosystems, rationally exploiting the coast,

protecting coastal wetlands and planting coastal shelterbelts, China aims to restore the mangrove swamps by 2010, and raise the costal areas' capability to resist marine disasters.[20]

.
.
.

The country will further improve its all-round capability to control and prevent marine disasters in coastal regions through establishing and further improving an emergency response system for marine disasters. It will set up observation and service networks to analyze, evaluate and forecast climate change in coastal areas, establish a system to monitor, forecast, analyze and evaluate sea level change and do a better job in this regard, and improve the capability of the marine ecosystem and coastal region ecosystem to cope with and adapt to climate change. The state is promoting R&D of technologies for marine ecosystem protection and restoration, popularizing the research results, reinforcing the construction and management of marine reserves, carrying out restoration work in coastal wetlands and marine eco-environment, setting up demonstration areas with typical marine ecosystems, and building coastal protection forest belts with every effort. China will enhance the management of coastal zones, raise protection standards of coastal cities and major engineering projects, prevent excessive exploitation of groundwater and take measures against land subsidence in coastal areas. As one of such steps, fresh water will be taken from rivers or reservoirs to dilute brackish water and deter seawater intrusion in estuaries.[21] [sic]

2.1.5 China's Sea Level Communiqué (2009)

The following excerpt has been translated from the original Chinese.

In order to effectively address the influence of sea level rise, the State Ocean Administration continues to carry out the work of checking and ratifying benchmark tide levels with the goal of further strengthening the work of monitoring, forecasting and assessing the effects of sea level rising. [The SOA] has also launched an investigation into the influence of sea level change in China's coastal areas to understand its nature and assess the situation in 2009.

In order to keep coastal development sustainable and effectively mitigate the influence of sea level rise, the following are proposed:

(1) Coastal governments at all levels should highlight the influence of

[20] This paragraph belongs to a part titled "Strategies and Objectives for Addressing Climate Change of the document."

[21] This paragraph belongs to a part titled "Policies and Actions to Adapt to Climate Change of the document."

sea level rise, reinforce investigations into sea level change, assess the local effects of the influence, and properly consider sea level rise when crafting local development plans.

(2) To conduct sea level rise effect-assessment in major coastal economic zones, we must utilize findings on the effects of sea level rise and vulnerable zones as the key guideline in major coastal economic zone plans.

(3) In the Liaoning Coastal Development Area, Caofeidian New Area, Yellow River Delta Eco-efficient Zone, we should pay close attention to the influence of saltwater intrusion and soil salinization; carefully and rationally allocate water resources; construct water conservancy facilities; plan saltwater culture zones; and mitigate the influence of saltwater intrusion caused by sea level rising.

(4) In the Tianjin Binhai New Area, Yangtze River Delta Economic Zone and Pearl River Delta Economic Zone, we should strictly control building height and density and groundwater exploitation to reduce sedimentation and slow down sea level rise.

(5) In severe zones of saltwater intrusion such as the Pearl River estuary and Yangtze River estuary, we should allocate water resources for the whole drainage basin, store fresh water and reduce saltwater levels, and ensure the safety of the water supply during seasonal periods of high and low sea levels.

(6) In the coastal areas of Zhejiang, Fujian, Guangdong and Hainan, we should pay close attention to typhoon landfalls and track them during periods of seasonal high sea levels and high astronomical tide, and consider the harm of sea level rise in early warning and preparatory schemes for disaster prevention and reduction so as to mitigate the harm of storm surges.

(7) The embankment's standard should be revised in light of sea level rise monitoring and forecasting.

(8) In coastal wetlands, mangrove forests, and other sea protection zones, a network for protecting coastal ecosystems should be established to mitigate coastal erosion caused by sea level rise.

2.1.6 China's Policies and Actions for Addressing Climate Change - The Progress Report 2009[22]

The following excerpts are from the official translation of the document.

Since 2008, China has established a working mechanism for addressing climate change for the marine sector, and worked out *the Plan for Coast Protection and Utilization*, *the 2009 Working Plan for Investigating and Assessing the Impacts of the Sea Level Changes*, and the Proposal for the Climate Change Monitoring (Observation) Capacity Building Projects of the

[22] This document was issued by National Development and Reform Commission in November 2010.

Marine Sector and is periodically issued its Annual *Report on the Addressing of Climate Change in the Marine Sector*, thus further improving the plans for addressing climate change in the marine sector.

.
.
.

In 2008, China intensified its efforts in constructing, supervising and administering the marine protected zones, newly built 8 national-level special marine reserves, and established 18 areas in the coastal zones for marine ecology monitoring covering a total area of 52,000 square kilometers. It actively restored the marine ecology in the areas of typical and rare marine ecology, areas invaded by alien species, ecologically sensitive areas, and special islands, and undertook the projects of restoring the ecology of seaside wetland, researching and demonstrating the critical technologies for oceanic pastures, and planted mangrove woods and protected coral reefs, thus gradually increasing the ability of the marine ecological system to adapt to and mitigate climate change.

In 2008, China enhanced the emergency management of marine hazards, actively engaged in the monitoring, survey and assessment of the rise of sea levels, coastal erosion, seawater intrusion, and soil salinization, timely issued early warning about storms, sea waves, and sea water hazards, and effectively reduced the casualty and financial loss caused by various marine disasters. [sic]

2.1.7 China's Policies and Actions for Addressing Climate Change - The Progress Report 2010

The following excerpts are from the official translation of the document.

Observation on sea climate is strengthened. State Ocean Administration positively conducts the work of carbon dioxide sea-gas exchange flux and sea level change monitoring, and has implemented such work concerning 5 fault surfaces and 5 voyages in the major inspection zone of North Yellow Sea. State Ocean Administration has organized coastal ocean management divisions at all level to carry on the investigation on sea level change in the whole country, the inspection of saltwater intrusion in 31 coastal areas and soil salinization in 21 coastal areas, and the risk assessment on saltwater intrusion and soil salinization in Liaodong Bay.

.
.
.

State Ocean Administration has set up the particular leading team of addressing climate change, compiled *Working Scheme on Addressing*

> *Climate Change in Ocean Field (2009-2015)*, and established the professional carbon dioxide sea-gas exchange flux and sea level change inspection system. [sic]

2.2 Policies, Actions and Suggestions in the "Real" Society

2.2.1 Academia

From the 203 papers in the China Knowledge Resource Integrated Database, there are two notable ones that properly address policies, actions and suggestions for addressing the sea level change. The first one is *Plan Countermeasure about Sea Level Rising of Xiamen*, LI Xiaogang, Modern Urban Research, May 2008. The second is *Advances in research on sea level rise of China offshore and some countermeasures*, ZONG Hucheng, ZHANG Weisheng, ZHANG Jinshan, Hydro-Science and Engineering, April 2010. The other papers lack systematic and in-depth analysis of the aforementioned policies, actions, and suggestions.

2.2.2 Local government

A survey of the websites of 31 Chinese provincial governments and the websites of their Development and Reform Commission divisions reveals no specific activities or programs aimed at addressing sea level change. There is, however, some mention of climate change. As mentioned in section 1.2.2, every provincial government has implemented some sort of program addressing climate change. But because local governments are limited by expertise, technology, funding, etc. the possibility of complete implementation of these plans is uncertain.[23] For example, in 2006,

[23] See China's local governments begin to legislate to address climate change,

Shanghai adopted its 11th Five Year Plan for Ocean Economic Development, which is an ambitious plans for addressing sea level change and if implemented would be far ahead of other local governments in this respect. The plan, however, might be overly ambitious as it calls for the adoption of eight key measures and attempts to address sea level change through a comprehensive program of research, supervision, planning and creation of tools.

2.2.3 NGOs

We have found no particular activities or programs related to sea level change in China's mainland on either the websites of China's more prominent environmental NGOs or on the websites of several international environmental NGOs that operate in China. [24][25][26] Even in the Standpoint of Addressing Climate Change of China's Civil Society (2009) article discussed in Section 1.2.3, there is no mention of sea level change.

At the grassroots level, there has been at least one instance of an activity aimed at dealing with sea level change. The Dalian Environmental Protection Volunteer Association organized an "Action Day of Addressing Climate Change for Dalian's Youth-Rising Sea Level" highlighting action, art and information on sea level change

---

http://www.ah.xinhuanet.com/news/2010-10/08/content_21066611.htm.

[24] Some grassroots NGOs include Friend of Nature (www.fon.org.cn), Friend of Earth (www.foe.org.hk) , Global Village (www.gvbchina.org.cn), Institute of Public and Environmental Affairs (www.ipe.org.cn) ,Global Environmental Institute (www.geichina.org), etc and some semi-official NGOs such as All-China Environmental Federation (www.acef.com.cn), China Environmental Protection Foundation (www.cepf.org.cn), China Environmental Culture Promotion Association (www.tt65.net), etc.

[25] Such as Natural Resource Defense Council (www.nrdc.org), World Wildlife Fund (www.worldwildlife.org), Conservation International (www.conservation.org), The Nature Conservancy (www.nature.org), etc.

[26] China Environmental NGO Online, www.greengo.cn.

on October 24, 2009. 150 volunteers and citizens were involved in the event.[27]

2.2.4 The General Public

A search of Google and Baidu reveal that there is a paucity of opinion and activities among the general public on the issue of sea level change. And the few mentions of sea level rise can probably be discarded as too academic to be said to accurately reflect acknowledgement by the general public.[28]

In the "Public Consciousness of Climate Change" article discussed in section 1.2.4, there is no mention of sea level change. To reiterate, when asked who should be responsible for addressing climate change, people mentioned, in order of decreasing frequency, the government (72.3%), NGOs (9.7%), corporations (7.5%), and the general public (6.2%).

3. Critical analysis of the Recognitions, Policies, Actions and Suggestions Concerning Sea Level Change

Recognition, policies, actions, and suggestions concerning sea level change have gradually been developed, which is reflected in the changes in the documents' names and their issuing entities. For example, in 2009, the institute that issued "China's policies and Actions for Addressing Climate Change" switched from the Information Office of State Council to the National Development and Reform Commission, moving from a less significant office to the most powerful ministry in China.

[27] See: http://www.depv.org/infoshow.asp?id=580.
[28] Baidu is the most popular search engine in China, akin to Google in the United States.

Simultaneously, the name of the document was changed to "China's Policies and Actions for Addressing Climate Change – The Progress Report," from a general document with primarily descriptive and propagandistic value to an annual special report with more comprehensive and practical value. Another example is the inclusion of a separate and special, section in the 2008 China Sea Level Communiqué that deals with sea level change in depth. Yet despite these advances, there are still problems to be addressed.

3.1 Critical analysis on the recognitions

3.1.1 Common Recognition

There is a consensus on at least a few facts concerning sea level change: sea level change primarily refers to sea level rising; sea level rising has detrimental effects such as coastal erosion, seawater intrusion, soil salinization, etc, and in the past few decades, the rate of China's sea level change has been higher than the global rate.

It can be said that consensus among different sectors reflects a common understanding and that it creates a basis upon which to approach countermeasures. Nevertheless, consensus is also problematic, particularly because it has resulted in a scarcity of contrary opinion, even in academia. For example, the consensus does not consider the plausible possibility that sea level change may not in fact be anthropogenic. Without deep and thorough discussion and research, the consensus may be unprepared to meet challenges down the road.

Another phenomenon deserves to be highlighted. Most recognition of sea level

rise from non-governmental sources appears after 2007. This means that there is a possibility that they derive directly from official opinions or that they are influenced by official opinions. If this is the case, then it can hardly be said that there is a real consensus, for the recognition may just be individuals parroting the government stance on the issue. Either scenario illustrates the remarkably large influence that official opinion has in China.

3.1.2 Different Sectors Have Different Emphases

Despite a common recognition of sea level change, different sectors emphasize different aspects of sea level change. Comparatively speaking, the government's recognition tends to be more general and political; their positions can be regarded as summaries and guidelines. [29] Different divisions within the government may, however, still have different emphases. For example, the National Development and Reform Commission's approach is general and political, while the State Ocean Administration's approach is very concrete and practical. Non-governmental sectors emphasize aspects of sea level change that relate to their own interests: the general public is mainly concerned with serious issues and the entities responsible for addressing them; NGOs discuss concrete topics that may help them enhance consciousness of their cause and advance their conception of civil society; and academia is often focused on hot academic topics.

What then, is the relationship between these different emphases? Do they

[29] Here, "political" refers to a means of expression that highlights the good rather than the bad or describes something unfavorable through the skillful use of words and perspective.

express the same point in different words? Can they supplement each other? The descriptions of the different emphases suggest that they each focus on some portion of the consensus while adding a little bit of their own agenda; there does not seem to be a logical rule unifying all of the views. In other words, these differing views lack logical and systematic arrangement. Thus, these viewpoints do not supplement each other and may in fact undermine the legitimacy of the consensus.

3.2 Critical analysis of the Policies, Actions and Suggestions Concerning Sea Level Change

3.2.1 Lack of Transparency in Reasoning

The policies, actions, and suggestions almost universally neglect to discuss precisely why particular policies, actions, and suggestions are being adopted and how they will address the problem. As a result, the relationship between recognition of sea level change and the measures purportedly meant to address it is obscured. Of course it would be too much to expect comprehensive treatment in such short documents which were, in the end, aimed at addressing climate change generally rather than sea level change specifically. But this shortcoming should be highlighted for even some of the more influential sources, such as the China Sea Level Communiqué and academia in general, fail to discuss reasoning. Because of this lack of reasoning, concrete policies, actions, and suggestions are susceptible to challenge.

3.2.2 Lack of Enforcement Mechanisms

The main handicap of these policies, actions and suggestions for addressing sea level change is the lack of enforcement mechanisms. There are at least four reasons for this. Firstly, the subject matter is somewhat abstract, so that the goals and countermeasures can be ambiguous. Secondly, there is little mention of the technology initiatives necessary for the implementation of some of the measures mentioned. Thirdly, there has been neither an attempt to foster cooperation between governmental and nongovernmental actors and between divisions within the government, nor has there been an attempt to clearly define their respective roles. Finally, an assessment method to check and review the measures and assign responsibilities has not been proposed. Without one, it difficult to know which policies are working and which ones are not. For example, China's National Climate Change Programme outlines goals for 2010, but does not mention any way to assess or evaluate whether or not they have been achieved.[30]

In comparison, the State Ocean Administration does a good job promulgating the policies set out in its China Sea Level Communiqué and generally formulates concrete suggestions. Still though, the SOA's efforts at enforcement fall short because: firstly, suggestions are not commands; and secondly, the State Ocean Administration is not a powerful division of the government – it is merely a bureau affiliated with the Ministry of Land Resources and whose head is equivalent in position to a vice

[30] Of course, in terms of policies, actions and suggestions for addressing climate change, there is some content relevant content relating to assessment, but the entire assessment or evaluation is not available partly because China's Policies and Actions for Addressing Climate Change – the Progress Report 2011 is pending.

minister in the Ministry of Land Resources.

A final interesting fact is that the 2010 China Sea Level Communiqué was not published until mid-2011; it is supposed to appear every year in January. At the same time, the head of the State Ocean Administration changed in February of 2011. Although it is unknown whether there is a relationship between these two facts, it is certain that the irregularity of the appearance of the Communiqué will influence public foresight and the stability of regulation to come which can only have a detrimental effect on enforcement.[31]

3.2.3 Lack of Mechanisms for Redress

Even in the realm of climate change, there has been little discussion of mechanisms for redress. Firstly, there has been no discussion of legal liability for violations of any of the regulations despite the fact local governments beyond the county level are often required to report the progress of the implementation of measures aimed at addressing climate change to higher government. Secondly, only administrative agencies have been involved in enforcement. Although some local legislatures have promulgated local regulations, these do not give common people or civil society in general the standing to bring cases before the courts, even when they are unable to participate in administration.[32]

In summary, it seems that effectively, only the central government is involved in

[31] If these two facts have some relationship, it would be dangerous because it might mean rule by man rather than rule of law. In that case, what could be said of the validity of the Communiqué?

[32] For example, in the Regulation of Qinghai Province Addressing Climate Change, the key word referring to public participation is "encourage," reflecting the reality that concrete procedures and methods are lacking.

redress, and that it is nobody else's business. Thus, the validity and reliability of the measures aimed at preventing climate change may be undermined by this "one-man show." If failures are allowed to go unchecked, we may not be able to confront serious disaster when it presents itself.

Conclusion

To summarize, even though China has taken some commendable steps to address sea level change, there are still several problems should be highlighted: First, in contemporary China, recognition and suggestion, and especially, policies and actions for addressing sea level change, are primarily within the province of the central government. The general public, and even civil society and academia, are relatively impotent. Second, measures for addressing climate change in general have been conducted by the central government and implemented from top to bottom. Though some local governments have innovated in this respect, their measures have been immethodical. Consequently, local efforts specifically aimed at addressing sea level change suffer the same problems. Third, to some extent, the current government literature concerning policies and actions addressing sea level change are primarily pronouncements than concrete plans of action; they are descriptions of achievements rather than analyses of the problems. Their sole value derives from their role as sources of information, reference and guidance for local governmental and non-governmental actors.

The following suggestions may be helpful: add sections in the annual report

addressing problems and weaknesses; strengthen enforcement through the disclosure of information, the assignment of specific roles for different sectors, and the establishment of institutions for assessment; and ensure public participation, including improving mechanisms for redress.