S. HRG. 111–710

CHALLENGES TO WATER AND SECURITY IN SOUTHEAST ASIA

HEARING

BEFORE THE

SUBCOMMITTEE ON EAST ASIAN
AND PACIFIC AFFAIRS

OF THE

COMMITTEE ON FOREIGN RELATIONS
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

SEPTEMBER 23, 2010

Printed for the use of the Committee on Foreign Relations

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html

U.S. GOVERNMENT PRINTING OFFICE
62–191 PDF WASHINGTON : 2010

For sale by the Superintendent of Documents, U.S. Government Printing Office
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CHALLENGES TO WATER AND SECURITY IN SOUTHEAST ASIA

THURSDAY, SEPTEMBER 23, 2010

U.S. SENATE,
SUBCOMMITTEE ON EAST ASIAN AND PACIFIC AFFAIRS,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:28 p.m., in room SD–419, Dirksen Senate Office Building, Hon. Jim Webb (chairman of the subcommittee) presiding.

Present: Senator Webb.

OPENING STATEMENT OF HON. JIM WEBB, U.S. SENATOR FROM VIRGINIA

Senator WEBB. Good afternoon. The hearing will come to order.

And let me begin by apologizing for the delay in the start of the hearing. We had a series of votes, the last one having just been called, about 2:20. So, we will move with some dispatch here to hear the witnesses and have the dialogue that the hearing is anticipated to bring.

Today's hearing will explore the critical intersection of the environment, foreign policy, and security in Southeast Asia, a nexus that occurs along the Mekong River. Often called "the mother of all rivers," the Mekong originates on the Tibetan Plateau, flows nearly 3,000 miles down through Burma, Thailand, Laos, Cambodia, and Vietnam before emptying through the Mekong Delta into the South China Sea. It is the world's 12th longest river and the center of a nearly 500,000-square-mile watershed across the region.

The Lower Mekong River, in mainland Southeast Asia, is a source of water, food, and economic opportunity for more than 60 million people. In this area, freshwater fisheries provide at least $2 billion, and up to $9 billion, annually in income, and approximately 80 percent of the animal protein consumed by the population.

Given the vital role of the river in this region, scientists, environmentalists, and policymakers have great concerns that current designs to construct hydropower dams along the Mekong may disrupt the region's balance. This hearing will examine the risks of this development, the environmental, economic, sovereignty, and security challenges these dams pose for the Mekong River, the challenge of managing transboundary water resources through multilateral cooperation, and the role that the United States can play in promoting this approach.

Currently, China plans to construct more than 15 dams on the main stem of the Upper Mekong River, in Tibet and Yunnan prov-

inces. In Yunnan, Chinese authorities are planning a cascade of eight large-to-mega-size dams, four of which have been completed. The largest of these four, the Xiaowan Dam, is the world's highest compound concrete arch dam, taller than the Hoover Dam. Its reservoir will hold 15 billion cubic meters of water. For comparison, the Three Gorges Dam in China holds 20 billion cubic meters of water.

Future dams in the Yunnan cascade will have even larger reservoirs, enabling China to regulate the waterflow to suit its needs. For their part, Laos, Thailand, Cambodia, and Vietnam are planning to construct or finance the construction of up to 13 dams on the lower half of the river's main stem. Compared to China's Xiaowan Dam, most of these dams will be a quarter of the size, in terms of height and hydroelectric capacity.

Additional dams have been planned or constructed along the Mekong's tributaries. These dams are intended to generate electricity in support of growing regional energy demand. Some of the electricity will even be exported, particularly from Laos, which has voiced its goal to become the battery of Southeast Asia.

These dams may also be used to store water, increase irrigation, and contribute to flood control. However, these dams will also affect the river's waterflow, its fish population, and wildlife. Low environmental standards, and weak enforcement of those standards, may allow these dams to bring catastrophic damage to the river's ecosystem. Moreover, the uncoordinated construction of these dams may threaten the entire region's stability if, as projected, food production decreases and countries begin to compete for access to water.

The economic benefits derived from electricity production could be short-lived in this case if tensions over access to transboundary water resources flash into greater political instability.

Over the past year, I've traveled to all of the countries in mainland Southeast Asia. And during these visits, as well as here at home, I've examined water-use practices and plans for the river's development. I've engaged numerous American and regional diplomats, policymakers, environmental engineers, and academics, all of whom convey the importance of the Mekong River to Southeast Asia's economic sustainability and to its human security.

In particular, the Tonle Sap Lake in Cambodia, the largest body of freshwater in Southeast Asia, plays a critical role in the region's food production system. During the wet season, when the Mekong's water levels are highest, water flows from the river into the lake, filling it up. When water levels drop with the dry season, water flows reverse and the lake empties back into the river. Nowhere else in the world is the flow reversal or river pulse so large.

The region's fish species and migration patterns depend upon this river pulse, with fish migrating upriver as far as Yunnan province in China. The volume of fish migration in the Mekong is estimated to be 100 times larger than the volume of fish migration in the Pacific Northwest.

Annual floods also naturally restore soil nutrients and purge pollutants, facilitating agricultural productivity. Consequently, Thailand and Vietnam have become the world's leading exporters of rice.

The Tonle Sap River pulse, the extent of fish migration, and the flow of sediments into the delta are all at risk from the unchecked construction of hydropower dams along the Mekong River mainstream.

With mounting evidence, experts estimate that existing and planned hydropower dams may block the migration of 70 percent of the most commercially important fish. Decreasing water flows, particularly in the dry season, may contribute to saltwater intrusion into the Mekong Delta and threaten freshwater rice production.

In June, I traveled to the delta, to Can Tho, in Vietnam, where environmental scientists reported that, over the past 20 years, seawater has crept 20 kilometers further up into the Delta. They expect that this intrusion will worsen as upstream hydropower dams further restrict waterflow.

Given the severity of these risks and their transboundary consequences, it's vital to consider ways to address water resources management and the development of hydropower dams through multilateral cooperation. The Mekong River Commission, established in 1995 by Thailand, Laos, Cambodia, and Vietnam, is one regional organization attempting this approach.

In August 2009, I met with the Mekong River Commission in Laos and observed the valuable role that it plays in collecting data on the river, forecasting the impact of hydropower development, and catalyzing a regional approach to water management.

I'm concerned, however, that the effectiveness of this organization is limited by two major factors. First is the lack of membership by two Upper Mekong countries, China and Burma. In fact, China is one of the few countries in the world that does not recognize riparian water rights of downstream nations. Yet, it is the gatekeeper for the Mekong River and all of the water that flows downstream from the Tibetan Plateau.

Without China's meaningful participation in regional river management and consideration of downstream nations, the Lower Mekong countries are vulnerable to China's control over water flows. This concern should include China's potential ability to hold back the river at its source.

Second, the commission lacks the power to prevent environmental and economic harms that may occur when parties fail to account for regional impacts in the development of hydropower. It also lacks the power to hold nations liable for environmental or economic damage resulting from these developments.

Southeast Asia is in need of a methodology, either political or economic, or both, that can raise environmental standards, mitigate the negative impacts of water use and development, and ultimately hold countries responsible for their actions.

With U.S. participation, the Asian Development Bank's financing of infrastructure projects presents one opportunity to influence regional environmental practices. The ADB is the only regional organization to which all Mekong countries belong. And it has played a significant role in funding the development of hydropower and electricity transmission systems throughout the region.

Presently, this committee is developing legislation to authorize the U.S. capital contribution to the Asian Development Bank. This

bill also provides an opportunity to revisit the role that the ADB plays in Southeast Asia, particularly in financing infrastructure projects and in improving environmental standards. To this end, I've been working, with input from several organizations, including the World Wildlife Fund, the Nature Conservancy, International Rivers, and the Stimson Center, to develop language that would raise the environmental standards for hydropower dam or electricity transmission projects financed by the ADB.

This language, if adopted, would instruct the U.S. executive director at the Bank to vote against financing a project if the Treasury decides not to certify to Congress that the process adheres to internationally recognized environmental standards, and that it protects the rights of individuals affected by the project, and reflects a multilateral approach to development along the Mekong River.

I've shared the language under consideration with our nongovernment witnesses, and I would be interested in hearing any thoughts that they might have on that, and any other policy suggestions, as the hearing goes forward today. And I will look forward to working with Chairman Kerry and the committee to include some form of this language in the ADB authorization.

United States attention to the health and well-being of the Mekong River in Southeast Asia can be a vital factor in facilitating a positive multilateral solution to the risks facing the region. Additionally, we can encourage other countries to adopt long-term approaches toward developing the Mekong River that would balance each nation's economic development with the protection of the environment and the overall security of more than 60 million people.

I'm pleased to welcome two panels today to help us examine the challenges facing Southeast Asia's environment, economy, and security, and how the United States can facilitate better multilateral management of the Mekong River and the region's environment.

Our first panel, I would like to welcome Deputy Assistant Secretary of State Joseph Yun. This is the first occasion that Deputy Assistant Secretary Yun has had to appear formally before the subcommittee, but we've had several meetings, and I have enjoyed, very much, working with Secretary Yun to this point.

And I'd like, again, to congratulate you on your recent promotion.

Previously, Deputy Assistant Secretary Yun served as the Director of the Office of Maritime Southeast Asia in the State Department. He is a career member of the Senior Foreign Service class of minister counselor. His overseas assignments have been in South Korea, Thailand, France, Indonesia, and Hong Kong.

So, welcome, Secretary Yun. And please proceed.

STATEMENT OF JOSEPH YUN, DEPUTY ASSISTANT SECRETARY, BUREAU OF EAST ASIAN AND PACIFIC AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC

Mr. YUN. Thank you very much, Chairman. And thank you for inviting me here today to discuss the importance of the Mekong River to the sustainable development and security of the Mekong Basin and key aspects of our engagement strategy on these issues with the Southeast Asia region.

With your permission, I would like to make brief remarks and submit a longer statement for the record.

Senator WEBB. Your longer statement will be entered into the record at this time. And please proceed with any other comments you'd like to make.

Mr. YUN. In her remarks on World Water Day this year, Secretary Clinton stated that, "Water represents one of the great diplomatic and development opportunities of our time." By 2025, nearly two-thirds of the world population will be living under water-stressed conditions. Water scarcity and poor water quality will increase disease risks, undermine economic growth, limit food production, and become an increasing threat to peace and security.

The Lower Mekong region of Cambodia, Laos, Thailand, and Vietnam is one of Asia's most vulnerable areas to the impacts of climate change because of large numbers of people living in flood plains and low-lying coastal areas and because the people and economies of the region depend strongly on agriculture and ecosystem services. The region's extraordinary biodiversity is also at risk from human activities and both the direct and indirect impacts of climate change.

The Mekong is one of the most complex river systems in the world. It is the longest river in Southeast Asia, stretching over 2,700 miles, through six countries, nearly twice the length of the Colorado. Its watershed supports millions of people, providing over $2 billion in revenue from wild fisheries alone.

Within the lower basin are ecologically unique features that play crucial roles in regulating the flows of the Mekong. The Tonle Sap Lake, Cambodia's most important fishery, and, below that, the wide reach of the Vietnam Delta, which produces about 52 percent of Vietnam's rice and most of its aquaculture, fish, and shrimp exports.

The people of the Mekong River Basin depend heavily on the river. Irrigated agriculture and fishing engage 85 percent of the workforce within the basin. And for most farmers, the river is critical to their survival.

Poverty is still an enormous challenge in the region, and those who are dependent on the natural base of the Mekong are, of course, the first to suffer from any environmental damages and changes.

It is also important to note that the region holds great capacity for growth and economic opportunity. For example, United States exports to Vietnam have tripled in the last 3 years, with two-way trade reaching nearly $16 billion in 2009. And the region has proved to be very resilient during the recent economic downturn.

Economic growth results in growing energy needs, and the countries of the Mekong are increasingly turning to hydropower as a solution. Construction of dams on the Mekong River, however, may pose immediate and long-term threats to the food security and livelihood of the millions of people in the Lower Mekong Basin.

The impetus behind the Mekong dam projects is the creation of a regional electrical grid which will facilitate the development of the Mekong Basin. In the future, the Mekong and its tributaries could support an elaborate interlocking electric power generation, supplying Laos, northern Thailand, parts of Cambodia, and much

of Yunnan province in China. The economic stakes for dam construction are high, and the states of the Mekong Basin are eager for developmental benefits they can obtain.

On the upper stem of the Mekong, China's eight-dam cascade in Yunnan province, four of which are completed, will most certainly disrupt some of the river's natural function, as well as give China some degree of control over the timing and amount of water flows. During the dry season, the flows from China account for 40 percent of water supply in the Mekong system. During the wet months, the share is about 16 percent.

In the Lower Mekong, hydropower development plans have been plagued by weak oversight of required environmental and social impact assessments. The greatest downstream ecological impact of regional infrastructure development will be felt at Cambodia's Tonle Sap Great Lake and Vietnam's Mekong River Delta.

Upstream mainstem dams may degrade the Tonle Sap, affecting fish migration and population. The Mekong Delta of Vietnam may also suffer major consequences, including the loss of vital silt replenishment, resulting in increased saltwater intrusion and decreased rice production.

The Mekong River system is already beginning to show signs of strain brought about by its multiple competing uses. Although much attention is focused on the impact of future dams, immediate environmental threats also exist through overuse and pollution from industry, wastewater, and agriculture. Effectively managing transboundary water is an enormous challenge, particularly for the regions—for the nations in the region with different levels of economic development and past animosities.

Facing these difficulties, the Mekong River Commission has provided a framework for addressing transboundary water resources in the region. It has steered regional and watershed development since 1995, emphasizing avenues for cooperation, strategic planning, and continued dialogue. Although not a regulatory agency, the Mekong River Commission builds knowledge and technical capacity for member states of Cambodia, Laos, Thailand, and Vietnam through providing assistance and recommendations.

These problems are not easy, but cooperative solutions are possible. While the United States has a long history of engagement with the countries of Southeast Asia on a bilateral basis, there is an increasing awareness of the growing number of issues that transcend national boundaries. The countries of the Lower Mekong region share a variety of common interests and concerns. With those concerns in mind, Secretary Clinton launched the Lower Mekong Initiative in 2009 to help facilitate regional cooperation on the issues of environment, education, health, and infrastructure. This initiative seeks to coordinate effective responses to challenges, that are inherently regional in nature, through working-level visits, training workshops, conferences, and scientific and technological exchanges.

In concert with other technical agencies of the U.S. Government, USAID, and the State Department are making significant investments in order to further improve our regional programming. USAID programs incorporate U.S. expertise into a regional plan to address some of the key water and development challenges these

countries face. They also foster cooperation among the countries in the region to work together for a common purpose. U.S. leadership and increased attention may have had an impact on other regional players. Recently, China agreed to share more of its operational data with the Mekong River Commission and has allowed the visit by the Commission officials to China's Yunnan province to look at two of its four dams. Japan has also increased its involvement in the region, pledging $5 billion in assistance at the Japan Mekong summit in October 2009.

The administration recognizes the critical need to work closely with the countries in Southeast Asia to foster the rational use and sustainable development of the river resources before lasting environmental harm has been done and before the security of the region is jeopardized by improper planning on this important waterway. We hope to advance cooperation and expertise by continuing to expand the Lower Mekong Initiative by developing technical assistance programs mobilizing a whole-of-government approach. We are encouraged by the progress that has been achieved in such a short time and, with our Mekong partners, are pursuing activities that can bring the greatest gain for the region.

Thank you for giving me this opportunity to testify today. And I'm very happy to answer any questions you may have.

[The prepared statement of Mr. Yun follows:]

PREPARED STATEMENT OF JOSEPH YUN, DEPUTY ASSISTANT SECRETARY, BUREAU OF EAST ASIAN AND PACIFIC AFFAIRS, DEPARTMENT OF STATE, WASHINGTON, DC

Chairman Webb and members of the subcommittee, thank you for inviting me here today to discuss the importance of the Mekong River to the sustainable development and security of the Mekong Basin and key aspects of our engagement strategy on these issues with the Southeast Asia region.

THE GLOBAL WATER AND SANITATION CHALLENGE

In her March 22, 2010, World Water Day Speech, Secretary Clinton stated that "water represents one of the great diplomatic and development opportunities of our time." She noted that, "It's not every day you find an issue where effective diplomacy and development will allow you to save millions of lives, feed the hungry, empower women, advance our national security interests, protect the environment, and demonstrate to billions of people that the United States cares, cares about you and your welfare. Water is that issue."

By 2025, nearly two-thirds of the world's population will be living under water-stressed conditions, including roughly 1.8 billion people who will face absolute water scarcity (a level that threatens economic development as well as human health and well-being). Water scarcity and poor water quality will increase disease risks, undermine economic growth, limit food production, and become an increasing threat to peace and security.

More than 260 watersheds worldwide are shared by two or more countries. As water becomes scarce, tensions over shared resources are likely to rise—both within countries and among countries. Promoting joint management and using water to build trust and cooperation in conflict-prone regions are important tools in reducing the risks of future conflicts.

The effects of climate change will only exacerbate these challenges. Perhaps the most profound effects of climate change will be the shrinking of glaciers and rivers. Water availability will change as will the likelihood of extreme floods and droughts. These extreme events can affect more people than all other natural disasters combined.

The Greater Mekong subregion is one of Asia's areas most vulnerable to the impacts of climate change because of the large numbers of people living in floodplains and low-lying coastal areas and because the people and economies of the region depend strongly on agriculture and ecosystem services. The region's extraordinary biodiversity is also at risk from both the direct and indirect impacts of climate change.

As we know from our own experiences with the wetlands and marshes of large river systems such as the Mississippi, the management of these systems can have far-ranging societal and ecological impacts. Sustainable river management in the face of climate change is of great concern to us, as well as for those living in large watersheds around the world.

To help strengthen U.S. engagement in Southeast Asia, Secretary Clinton announced the Lower Mekong Initiative (LMI) in July 2009 on the margins of the ASEAN Post-Ministerial Meeting. The LMI aims to engage Cambodia, Laos, Thailand, and Vietnam by helping build regional capacity in the areas of environment, health, education, and infrastructure in order to facilitate multilateral cooperation among the four countries on issues of mutual concern, such as the common challenge of effective water resource management

Also in response to this challenge, Secretary Clinton has asked Under Secretary for Global Affairs Maria Otero and U.S. Agency for International Development Administrator, Rajiv Shah, to identify specific steps we can take to strengthen the United States capacity to respond to watershed management and climate change. We are also establishing a joint steering group under the leadership of Bureau of Oceans, Environment, and Science Assistant Secretary Kerri-Ann Jones.

THE COMPLEXITY OF THE MEKONG SYSTEM

Hydrologically, the Mekong River is one of the most complex river systems in the world. It is the longest river in Southeast Asia, stretching 2,703 miles through six countries, nearly twice the length of the Colorado River. Its watershed supports between 65 and 80 million people, providing over $2 billion in revenue from wild fisheries alone.

The large flows of the Mekong—nearly as large as those of the Mississippi—vary widely according to available precipitation. The basin has a wet season and a dry season. During the wet season, only about 16 percent of the flows come from China. During the dry season months, this share rises to 40 percent. Due to the complexity and extent of the Mekong system, drought and flood events rarely affect the entire reach equally.

Within the Lower Basin are ecologically unique features that play crucial roles in regulating the flows of the Mekong: the Tonle Sap Lake, Cambodia's most important fishery, and, below that, the wide reach of the Delta, which produces about 52 percent of Vietnam's rice and most of its aquaculture fish and shrimp exports.

Located in the Cambodian floodplain, the Tonle Sap Lake is filled by the monsoon rains. When it overflows, it can temporarily reverse the flow of the Mekong. The surge in water storage in the lake is enormous, increasing from 1–2 million acrefeet in the dry season, to 40–60 million acre-feet in the wet season, enough to cover the State of New Jersey in 10 feet of water.

The injection of nutrient-rich sediments also creates one of the world's most productive ecosystems and the world's largest freshwater fishery. Through this natural action of seasonal storage, the Tonle Sap Lake regulates the flows of the Mekong, moderates flood events, provides crucial flows during dry months, and prevents the incursion of seawater within the Delta.

The Mekong Delta supports about half of Vietnam's total production of rice and provides food security for its population. Vietnam is one of the world's richest agricultural regions, the second-largest exporter of rice worldwide, and the world's seventh-largest consumer of rice. The Mekong River and its tributaries are crucial to rice production in Vietnam. A total of 12 provinces constitute the Mekong Delta, containing 17 million people, 80 percent of whom are engaged in rice cultivation. According to the United Nations Development Program in Vietnam and Vietnam's Ministry of Agriculture and Rural Development, the rice industry is under serious threat due to the 2010 heat wave, climate change, and upstream Mekong River development.

STRONG RIPARIAN DEPENDENCE ON THE MEKONG

The inhabitants of the Mekong River Basin depend heavily on the river. Irrigated agriculture and fishing engage 85 percent of the workforce within the Basin, and for most farmers the river is critical to their survival. Many farmers rely on fishing to supplement their incomes and provide nourishment. In every Mekong country fish are the most important source of animal protein; for many, the principal source of protein in their diet. Poverty still challenges the region, and those who are heavily dependent on the natural resource of the Mekong are the first to suffer from any environmental changes.

It is important to note that, while the region is still home to over 20 million people living in poverty, it also holds great capacity for growth and economic oppor-

tunity. For example, U.S. exports to Vietnam have tripled in the last 3 years, with two-way trade reaching nearly $16 billion in 2009. Regional economic growth in 2009 was 6 percent; proving the region's economy to be very resilient during the recent economic downturn.

HYDROPOWER PLANS

One result of increased development is that the countries of the Mekong Basin are increasingly turning to hydropower as a solution to their growing energy needs. Construction of dams on the Mekong River may pose immediate and long-term threats to the food security and livelihoods of tens of millions of people in the Lower Mekong Basin. However, awareness of these threats is rising rapidly due to the confluence of an extended drought this year and a concerted push by interested parties, including the United States through the Lower Mekong Initiative, to highlight the possible adverse affects of dam construction.

The impetus behind the Mekong dam projects is the creation of a regional electrical grid that will facilitate the development of the Mekong Basin. In the future, the Mekong and its tributaries could support an elaborate, interlocking electric power generation grid supplying Laos, northern Thailand, parts of Cambodia, and much of Yunnan province in China. The economic stakes for dam construction are high, and the states of the Mekong Basin are eager for the developmental benefits they can obtain.

All dams have an impact on the flow and natural ecology of rivers and streams, but in certain cases the developmental and environmental tradeoffs in terms of electric power and navigation can be justified. In the case of the 11 mainstream dams planned by Cambodia, Laos, and Thailand on the lower half of the river, disruption of the food security of 60 million people who depend on the river could be among the serious consequences resulting from damming the Mekong River. A single misplaced dam on the lower Mekong could block the path of migratory fish species that supply up to 80 percent of animal protein in the local diet. A reduction in freshwater flows caused by poorly designed dams could also increase the salinity of the river water, thus adversely affecting the rice crop.

The ambitious plans for investment in infrastructure should be grounded in a comprehensive analysis of where these investments would provide the highest return and what their hydrological impact would be. In the Lower Mekong region there is generally little analysis of soil and water quality, or other constraints to food production, when river modification is being considered. Often hydropower development plans have been plagued by weak oversight of required environmental and social impact assessments.

On the upper stem of the Mekong, China's eight-dam cascade in Yunnan province, four of which are completed, will certainly disrupt some of the river's natural functions as well as give China some degree of control over the timing and amount of river flows. But the greatest downstream ecological impact may be caused by downstream infrastructure development and would be felt in Cambodia's Tonle Sap Great Lake and Vietnam's Mekong River Delta. Mainstem dams, including two planned by Cambodia itself, may degrade the Tonle Sap, and the Delta may also suffer major consequences due to the loss of vital silt replenishment.

Hydropower remains a valuable energy resource, so long as the cost-benefit tradeoffs are fully understood and responsibly addressed. Many development projects must weigh the tradeoffs between the opportunities presented by new economic infrastructure—such as roads, bridges, and dams—and the full impacts to ecology and local livelihoods. The sale of electricity generated by dams provides a source of foreign revenue for countries with few existing alternative options for economic growth, but this may be unsustainable and comes with potentially significant environmental and social costs.

SYSTEM UNDER STRESS

The Mekong River system is already beginning to show signs of strain brought about by multiple competing uses. Although much attention has focused on the impact of future dams, more immediate environmental threats exist through overuse and pollution from industry, wastewater, and agriculture.

Maintaining water quality in the Mekong is key to sustaining the health and productivity of the populations dependent on it. High salinity levels are prevalent in the Delta, mostly during the dry months as diminished flows of the Mekong are unable to push back against seawater incursions. Moreover, agricultural runoff, municipal wastewater, industrial effluent, and sulphate-rich soils have resulted in elevated levels of acidity and eutrophication of the Lower Mekong watershed.

The Lower Mekong countries have recently started to address the issue of water pollution, but the region is plagued by lagging enforcement and monitoring. Upstream sources of water pollution, as well as domestic wastewater continue to degrade the health of the river. Certain municipalities, for example, discharge the majority of their untreated sewage directly into the river.

While the state of the Mekong environmental system is threatened by existing pollution and future development, the few completed monitoring studies have found that the effect of pollution on Mekong fisheries has been limited thus far. While the current impact of development along the Mekong is also limited, future threats to fisheries, water quality, and human health are most likely to come from human interference in the form of dams, increased transportation, additional habitat destruction from land-use changes, and continued water pollution.

The State Department has provided some small grants to a network of universities in the region to study the levels of pollution in the river. This effort has enhanced collaboration among research institutions within the four nations in the Mekong Basin. More studies are needed to fully understand development's effects on the Mekong's fragile biodiversity and to strengthen nascent research partnerships.

Beyond the impact of human activities in the watershed affecting the Mekong River Basin, climate change will undoubtedly add to the list of challenges. Changing rainfall patterns, glacial melting, and greater hydrological variability may increase the likelihood of floods and droughts. Given an average elevation of around five feet, sea-level rise poses a grave threat to the Vietnam Delta.

LOCAL POLITICS AND WATER POLITICS

Shared water issues among the Mekong countries are managed through a series of overlapping legal and institutional arrangements, such as navigation agreements. Effectively managing transboundary water is a significant challenge, particularly for riparian nations with different levels of economic development and past animosities. Facing these difficulties, the Mekong River Commission has steered regional watershed development since 1995, emphasizing avenues for cooperation, strategic planning, and continued dialogue.

Under the 1995 Mekong Agreement signed by the Governments of Cambodia, Laos, Thailand, and Vietnam, the Mekong River Commission (MRC) has provided a framework for addressing transboundary water resources in the region. Its structure has allowed for needed flexibility and resiliency as hydrologic and economic realities shift. Major foreign donors to the MRC include Germany, Australia, Sweden, and Denmark.

Since 1995, the MRC has widened its scope. While remaining a forum for cooperative discussions, it has moved from large-scale basin planning to include small-scale resource development and the establishment of a knowledge base in lower basin hydrology. Although not a regulatory agency, the Mekong River Commission builds knowledge and technical capacity for member states through providing assistance and recommendations.

In the future, the MRC will be forced to address difficult issues of water allocation and basin management. Hydropower development and analysis of water flows during the dry season must be discussed to craft adequate cooperative solutions. Responses to floods or droughts require strengthened communication between riparian countries. These problems are not easy, but cooperative solutions are possible.

In response to these challenges, Secretary Clinton launched the Lower Mekong Initiative (LMI) in 2009 to help address regional issues, with a particular focus on the environment, health, education, and infrastructure. The LMI seeks to facilitate effective, coordinated responses to challenges that are inherently regional in nature through working level visits, training workshops, conferences, and scientific and technological exchanges.

U.S. leadership and increased attention on the LMI has had an impact on how other regional players view these issues. Recently, China agreed to share more of its operational data with the Mekong River Commission and has allowed a visit by Mekong River Commission officials to China's Yunnan province to look at two of the four dams. Japan has also increased its involvement in the region, pledging $5 billion in assistance at the Japan-Mekong summit last October.

U.S. POLICY REGARDING TRANSBOUNDARY WATER SECURITY ISSUES

The unfortunate reality is that there will always be disputes over water. Our involvement includes emphasis on building solutions that consider the environment and climate change, health, education, infrastructure, and economic growth. Through our support of multinational solutions, we hope to foster an environment

that will preempt instability and minimize the potential for violent conflict. In analyzing the potential for conflict, we look at factors that are driving tensions, as well as factors that can defuse tensions.

In the Mekong region we see only a few factors with the potential to contribute to conflict. Those factors are unilateral development of upstream infrastructure, bilateral development of downstream infrastructure, changing environmental conditions, and historical tensions in relations between Mekong countries. These instigating factors are to a large extent countered by some important mitigating factors. First, the Mekong countries recognize that they need to act in concert in the stewardship of the Basin. The Asian Development Bank (ADB) and other donors are helping to foster this collaboration. In addition, the MRC is a regional institution which has recently made significant strides and includes representation and support from each of the Basin countries. While much needs to be done to ensure the institution can effectively advance sound water resources management across the Basin, it provides a solid foundation for regional assessment, planning, and discussion. In our view, the MRC's existence greatly minimizes the likelihood of violent conflict among the Mekong states.

While the United States has a long history of engagement with the countries of Southeast Asia on a bilateral basis, there is an increasing awareness of the growing number of issues that transcend national boundaries. The countries of the Lower Mekong region share a variety of common concerns, including transboundary water management, infectious diseases, and vulnerability to climate change. Our Lower Mekong Initiative seeks to support a common regional understanding of these issues and to facilitate an effective, coordinated response.

In order to build regional capacity and cooperation, the State Department is working with other U.S. Government partners to develop innovative programs under the auspices of the LMI. "Forecast Mekong," a computerized decisionmaking tool the U.S. Geological Survey is developing with State Department support, will provide policymakers in the Mekong countries with the information they need to make good decisions on managing the Mekong waterways, including predicted effects of hydropower dams on water flow. This information will be made available on the Internet so that scientists and researchers, based in the region and around the world, can also access the data and the analysis capability. Also created under the auspices of the LMI is a "sister-river partnership" between the Mekong River Commission and the Mississippi River Commission that will help to build the capacity of the Mekong River Commission and to support its efforts to incorporate water-related concerns into regional decisionmaking.

USAID is also working to strengthen the capacity of the Lower Mekong countries to assess the environmental impacts of hydropower development at both the project and basin levels. Through the Asia Development Bank (ADB) and Greater Mekong Sub-Region Initiative, USAID will support partnerships between the countries to conduct Strategic Environmental Assessments for hydropower projects. In addition, USAID, in partnership with ADB, MRC, and the Worldwide Fund for Nature, has developed a sustainable hydropower development assessment tool, which will soon be piloted in various sub-basins within the watershed.

The United States has an important role to play here. We can inform regional policy and decisionmaking, build local capacity, and promote sustainable development by sharing advanced science and technology capabilities. Our goal in this area is not to determine the outcome of these discussions, but to give policymakers the tools they need to make informed decisions about development of the river.

Finally, in concert with other technical agencies of the U.S. Government, USAID, and the State Department are making significant investments in the health, environment, and education sectors. In addition to existing bilateral activities, we are further developing our regional programming as well. I would like to highlight the Secretary's announcement of $3 million from USAID for the study of climate change impacts on the Mekong Basin. Let me share a rough sketch of what we hope to accomplish with this money.

USAID will support the development of a regional adaptation strategy across the Lower Mekong. It will engage local institutions and conduct studies to assess vulnerabilities of the ecosystem as well as hold dialogues with a variety of stakeholders to gain support for a regional approach. Further into the program, we look to implement pilot projects and build platforms for sharing of information. Through an integrated and regional approach we will be able to build local and national government capacity for long-term planning founded on sound science and advanced technology.

These programs incorporate U.S. expertise into a regional plan to address some of the key water and development challenges these countries face. They also foster

cooperation among the countries in the region to work together for a common purpose.

Conclusion

The administration recognizes the critical need to work closely with the countries in Southeast Asia to foster the rational use and sustainable development of Mekong River resources before irreparable environmental harm has been done and before the security of the region is jeopardized by improper planning and exploitation of this important waterway. Mekong countries, including to some extent China, have realized the importance of united action by establishing the Mekong River Commission. We hope to advance cooperation and expertise by creating the Lower Mekong Initiative and developing technical assistance programs.

Building upon existing programs, we have mobilized a whole-of-government approach to our engagement in the Lower Mekong Initiative. We are sensitive to the needs and priorities of our Mekong partners and are pursuing activities that can bring the greatest gains for the region. We are encouraged by the progress that has been achieved in such a short time and look forward to planning the Third Lower Mekong Ministerial Meeting to continue the discussion to protect the Mekong River.

Thank you for extending this opportunity to me to testify today on this pressing and vitally important issue. I am happy to respond to any questions you may have.

Senator WEBB. Thank you very much, Secretary Yun.

I would like to ask you a few questions here. First of all, speaking of the Lower Mekong Initiative, you mentioned that the United States is contributing $3 million to a program examining the impact of climate change on water resources and food security. In fact, I was reminded of this contribution several times when I was in Vietnam in July. I am, at the same time, kind of curious about how much is being invested in areas where we can get a more immediate improvement.

In page 5 of your testimony, you mention a number of items that are similar to the areas that I have been attempting to get some attention to: the notion of the difficulty of upriver dams, which is a main purpose of this hearing, which affect riverflow downstream, much among other issues; the impact of growing population on pollution in the rivers; the lack of pollution standards—in fact, during my Vietnam trip, I was told that only 30 percent of the wastewater being put back into the river has been treated; and also, the increasing industrialization along the river, and the emissions that come from those facilities. What are we doing, in terms of the Lower Mekong Initiative, to assist in resolving those problems?

Mr. YUN. Thank you. We have, this year, in FY 2010—we will spend—this is our assistance to four Lower Mekong region—$219 million in assistance. I mean, that includes every assistance we have. A large part of that is—the biggest share of that goes to Vietnam. And I think that comes—to Vietnam—comes to about $90 million. And then next we have Cambodia, at about $72 million. And then, of course, smaller sums for Laos and Thailand.

Within that amount, the biggest amount is spent on public health programs. And I would emphasize two types of public health programs. One, we've done a lot in terms of PEPFAR, the HIV/AIDS program. And second one is the emerging and infectious diseases. And I think that's the area we'll be looking, in the future, to expand on. That's the area—we've recently had a conference among Lower Mekong countries, and that's the area we'll be looking to expand.

Let me just say a word about Lower Mekong Initiative. This——

Senator WEBB. Mr. Secretary, if I may.

Mr. YUN. Yes.

Senator WEBB. How much of that money is being spent on the Mekong River?

Mr. YUN. It is very small. It is a program that has just gotten underway last year. And as you know, our budget cycle typically takes 2 years. And we are now making the budget for FY12. In the meantime, we want to get whatever resources we can. And right now, as you mentioned, $2 to $3 million is devoted. And mostly, that will be for technical exchanges—doing conferences, bring experts over, and so on.

Senator WEBB. But, that money—let's get our facts straight here—that money, according to testimony, is principally being spent to examine the impact of climate change. Is that correct?

Mr. YUN. It's not only for climate change. We have also some money which will do—I don't know whether we've briefed you on Forecast Mekong, for example. That's a program, with the U.S. Geological Survey, in which we are trying to do a simulation model of water levels in Mekong. And so, some of that money was spent on that. And so, at the moment, I would say the budget for LMI is pretty much ad hoc. And we need devoted money. And this is what we are trying to work at.

We've had two LMI ministerials over the past 12 months, and we're going to have another one at the end of October. And before committing money to it, we would like to have some structure. And let me just describe to you the kind of structure we want to have.

We want to have full working groups within LMI: education, public health, environment and climate change, and, last, on infrastructure. Within this working group, we would have projects. And so, the simple answer to your question is, money issues, we believe, should come after there has been some serious work done—what kind of project is necessary. So, that's where we are.

Senator WEBB. So, if we're defining the objectives that could best be met with the relatively small amount of money that we have, in addressing the issues of the Mekong River itself, and you had $3 million, would you put it in climate change, or would you put it in wastewater treatment, or—what would you do?

Mr. YUN. It's kind of too small to put it any ways, but we want to use that money to get the working groups going, to have good degree of consultations and studies done so that we know, when the bigger money that we will be asking for—we'll know what to do with that.

Senator WEBB. Let me just——

Mr. YUN. We think of this as a long-term commitment, and we want to come back to—you know, to Congress, over and over again, and seek devoted funding. That's what we aim to do.

Senator WEBB. But, at the same time, my observation is that, having visited Can Tho and discussed these issues with people down there, when they're getting a certain amount of money for climate change, which is rather hard to get your arms around, and they have issues of pollution standards, effluence into the river, those sorts of things, let me encourage you to include those in your objectives.

Mr. YUN. Thank you. We will.

Senator WEBB. And, if I may, I have just another question on the Lower Mekong Initiative. Are you planning discussions to engage

countries, bilaterally and multilaterally, on the risks that are associated with these hydropower projects?

Mr. YUN. Most of our engagement on Mekong sites, so far, has happened with the Mekong River Commission. We, again, do give a little bit of assistance to Mekong River Commission. And we also work with a couple of large donor countries—Australia and Denmark, principally. And most of our engagement has been on that front.

We also have talked with Chinese, on occasions, on water usage in general, and also on Southeast Asia. So, we do engage China as well as Mekong River Commission.

Senator WEBB. As you know, China, which has about 20 percent of the Mekong River's water resources, is not a member of the Mekong River Commission. It also, as I mentioned in my opening statement, does not recognize downstream riparian water rights. And I was really gratified to see, recently, just over the past month or so, after we, in our country, began discussing this issue a little more openly, that China has been willing to share some data on the construction in Yunnan. And the dam projects in Tibet still remain a mystery. But, what do you think they need to do in order to demonstrate that they're acting responsibly, in terms of their obligations in the region?

Mr. YUN. I think they need to have a serious dialogue with downstream countries regarding, especially, the effects of the dams they're building, on waterflow. And so far, that has not taken place. We welcome, of course, China recently sharing some data, but it's not the whole set. And, you know, essentially, we want them to share not only part of the current—I think they're only sharing data—daily waterflow during wet season. We want them to share, during dry season, what happens. We also want them to share historical data. And it's really only looking through historical data you're going to get the trend. It's not—it's no good—I wouldn't say it's no good; it's some help. But, having the current data only is just a slice of the picture.

But, more than that, we would want them to be part of any kind of organization that takes place in that region, in terms of discussing overall effects, in terms of fisheries, in terms of the environment, and what this true cost and benefits are, so that people in the region can make the decision, based on true cost-benefit analysis.

Senator WEBB. China is very reluctant, particularly in this region, to engage in multilateral dialogue. Do you see any movement on that front with respect to these issues?

Mr. YUN. I think we have to encourage them. Mr. Chairman, you and I have recently discussed the issues of South China Sea, for example. And I think this is another example in which United States interests may not be directly involved, or we have no real presence there, in terms of sharing borders, but, at the same time, regional stability requires we look a little bit beyond and engage China and the neighboring states into a sustainable dialogue. It can be in a multilateral forum. I mean, there are lots of existing mechanisms.

We have, for example, there is the ASEAN mechanism, there is the Mekong River Commission mechanism. As you mentioned,

there is also the Asian Development Bank mechanism. But, beyond that, I think we need to, you know, be more engaged in the region with China and the neighboring states.

Senator WEBB. I would agree with that comment, and I appreciate your saying it. As I've said many times, the United States is a vital ingredient in maintaining regional balance. And, even as you point out, we do not have geographical boundaries in this area. We certainly can provide, sort of, facilitation in order to encourage multilateral cooperation. And, quite frankly, if American dollars are going into these projects, we can decline to invest in projects that are clearly harmful to environmental concerns.

Thank you very much, Secretary Yun. I know we'll be seeing you many times more in this subcommittee, and we appreciate your testimony.

Mr. YUN. Thank you very much.

Senator WEBB. The second panel today, I'd like to welcome three experts who've made notable efforts to document the risks facing the Mekong River and consider solutions to these challenges.

Dr. Richard Cronin is a senior associate at the Stimson Center, where he has directed the Southeast Asia Program since 2006. Dr. Cronin joined the Stimson Center after a long career with the Congressional Research Service. He received his Ph.D. from Syracuse University, his master's and bachelor's degree from the University of Houston. He is a veteran of the Vietnam war. Earlier this year, Dr. Cronin published a report entitled "Mekong Tipping Point: Hydropower Dams, Human Security, and Regional Stability," in which he analyzed the development of hydropower dams along the Mekong River, and the regional impacts of this activity.

Welcome again to this subcommittee, Dr. Cronin.

Ms. Aviva Imhof directs the Southeast Asia and Latin American programs at International Rivers. In her position, Ms. Imhof works with regional international partners to investigate hydropower projects, disseminate information, and provide technical, legal, and campaign assistance. Prior to this, Ms. Imhof directed the International River's Mekong program for 7 years. She was the lead organizer of Rivers for Life, the second international meeting of Dam-Affected People and their Allies, a conference in 2003 that brought together 300 people from 62 countries in Thailand. She has also written extensively on the efforts to halt destructive river development projects in Southeast Asia.

And welcome, Ms. Imhof.

Our third witness is Ms. Dekila Chungyalpa, from the World Wildlife Federation. She is the U.S. director for the Greater Mekong Program and has led WWF's efforts on the Mekong region since 2005.

In July, WWF released a study, entitled "River of Giants: Giant Fish of the Mekong," which profiles four giant fish species living in the Mekong that rank among the world's largest freshwater fish. Ms. Chungyalpa also leads WWF's activities on the river basin climate change adaptation and sustainable solutions for hydropower. Previously, she worked for 5 years with the WWF in the eastern Himalayas and has extensive experience working with local communities. Ms. Chungyalpa speaks five languages: Sikkimese, Tibetan, Hindi, Nepali, and English.

I thank all of you for being here today. And we will begin with Dr. Cronin.

Welcome.

STATEMENT OF DR. RICHARD CRONIN, SENIOR ASSOCIATE, THE STIMSON CENTER, WASHINGTON, DC

Dr. CRONIN. Thank you, Mr. Chairman.

I appreciate this opportunity to offer my perspectives on these urgent issues regarding water insecurity in Southeast Asia.

I've organized my written statement so as to respond specifically to the five questions that you posed. But, in this few minutes' time I have, I would like to——

Senator WEBB. Let me say, by the way, because I should have said it before, that your full statements will be entered into the record——

Dr. CRONIN. I thank you.

Senator WEBB [continuing]. At the beginning of each of your testimony. And you're welcome to take whatever time you like to make your points orally.

Dr. CRONIN. Thanks very much. I appreciate that.

My colleagues, in their statements, have already provided really eloquent and well-informed coverage of the human environmental tragedy that is unfolding. I will use my few minutes here to address two things. First—two points—one is the risks of both Chinese and proposed Lower Mekong projects the region's hard-won peace, stability, and the longer term prospects for sustainable development. Second, I will also address the Lower Mekong Initiative, which you've already been discussing with Mr. Yun.

The character and the impact of the 8 or more large-to-mega dams that China is building on the upper half of the river, and the dams—now 11 dams and one other water project—proposed for the lower river—lower half of the river in Southeast Asia by—primarily by Cambodia and Laos, are different but of equally negative impact. And again, in the written statement—and I'm sure you'll hear from my colleagues—China's dam cascade in Yunnan will have different impacts, as opposed to those of the Lower Mekong dams. China, basically, is going to change the hydrology of the river in a very serious way, and hold back silt in its dams, that is necessary to replenish fields and rebuild the Mekong Delta every year after the dry season. And the Lower Mekong dams, to put it briefly, will block the migration of wild fisheries—and we're talking fish—we're talking about fish worth about $9 billion as they work to—their way through the economy, and which constitute anywhere from 40 to 80 percent of the protein in diets of some 60 million people as you've already mentioned in your remarks.

From a regional peace and security perspective, the worst aspect of China's Yunnan cascades is capability of the two biggest reservoirs, one of which is already filling—the Xiaowan dam—to regulate flow of water from Yunnan to the Lower Mekong. China plans to use this storage to put as much as 40 percent or more water into the river during the dry season in order to keep its smaller, but still large, dams running year-round—that is, its three dams below Xiaowan—and to support navigation of large cargo boats between southern Yunnan and Luang Prabang, Laos.

Augmenting the dry-season flow can be—in years of drought—can be a positive benefit, but the amount of water that China plans to release in the dry season will reduce the normal extremes of wet and dry in the river that give it its great productivity, and particularly of aquatic life and agriculture. So, some water in the dry season, if it's unusually dry, will help, but that's not what China has in mind. China wants to put more water in the river every dry season. And during the dry season, China is the most important source of water in the river.

Even more troubling are the political and geopolitical ramifications. If Laos and Cambodia go ahead with their plans for damming the middle and lower reaches of the river, they will make themselves dependent on China to release water, from the Xiaowan Dam and this other even larger dam it's building, in the right quantity and at the right time to keep the dams operating downstream for several months of the year during the dry season. So, they're—Laos and Cambodia—setting themselves up, if they build these dams, to be totally dependent on China during the dry season, for most of those dams to keep operating.

Equally or more troubling, China has, thus far, refused to countenance making cooperative water management part of the agenda of the Asian Development Bank-led Greater Mekong subregion, known as GMS. The GMS originally started with 11 "flagship programs," they called them, but most of the money is going to build roads and bridges in the regional power grid that you referenced earlier. And China will not allow the river to be part of that discussion. So, we already have the MRC with the four Lower Mekong countries, and China is not a part of that. And then we have the GMS, where China is a part, as well as Burma—or Myanmar, as you wish—but won't let the water issue be discussed.

So, you made some comments in your statement about what we should be doing at the ADB. And I think that's one of the areas that the—where the United States should be using its influence.

Mr. Chairman, the Obama administration has made the Mekong Basin the focal point of its professed engagement with Southeast Asia and ASEAN, and not a moment too soon.

All of the Lower Mekong countries understand the geopolitical nature of the U.S. initiative; and, to varying degrees, they all welcome it. Because of the wider context of enhanced United States engagement with ASEAN, the LMI has been welcomed by most other Southeast Asian countries, due to concern about China's hegemonic potential, both in mainland Southeast Asia and the South China Sea.

One serious weakness of the LMI, at present, and one that you've already addressed in your questions to Deputy Secretary Yun, is that the initiative originated in the Bureau of Asian Pacific Affairs. It's a foreign policy initiative not backed by much in the way of coordination or funding. Its programmatic pillars of health, education, climate change, and infrastructure were developed—were really developed on an ad hoc basis. And one of the problems right now—and you raised this issue is that the infrastructure pillar is empty. And the reason it's empty, I think, is that there are no programs to be rebranded under the LMI. So, the infrastructure side is where, if we're going to put more money into this initiative, it

ought to be—on the river itself, on the hydrological issues, and the, you know, the future of fisheries and food security and human security and the Mekong Delta.

This, however—infrastructure actually is an area where the United States should be providing, and could be providing, technology and capacity-building, especially in modeling, river monitoring, and full-scope cost-benefit analysis of proposed dams and other infrastructure programs. I think, again, Deputy Secretary Yun alluded to us moving in this direction. But, I don't think—I don't sense that that's going to come fast enough to have an impact on a river which really is at a tipping point.

Thus, the most urgent need is planning and coordination, especially for getting adequate funding in place for fiscal year 2012. I agree entirely with your legislative initiative on the ADB authorization. The United States should be leveraging its influence and voting power on the boards of directors of not only the ADB, but also to the World Bank, to get them to partner with the United States in supporting specific LMI programs or program objectives. In other words, it doesn't have to be the LMI, exactly, but if we can get—leverage our influence to get them involved in this issue, that would be a great benefit.

Neither the ADB nor the World Bank can get directly involved in construction—constructing mainstream dams on the Mekong, because their extreme environmental and socioeconomic impacts are too severe to pass muster with the Bank's own criteria. The risk, though, is that, as in the case of Laos' recently completed and controversial Nam Theun 2 Dam on a major tributary, the Bank should not participate in funding the project. Let me clarify what I'm saying here. There's a risk that the banks will jump in, to be relevant, and put money into environmental mitigation—if it's possible—relocation and alternate livelihoods for dams that it cannot otherwise support under its own principles. This is a slippery slope. They started on this slope at Nam Theun 2. And I think a big mistake for the banks to—in the interest of, perhaps, being relevant to the countries in the region—to get involved in these secondary aspects to mitigate or environmental damage or relocate people and give them—help them get new livelihoods.

Finally, Mr. Chairman, the United States should not, cannot, and does not, seek to compete with China for infrastructure assistance or obstruct the growing economic integration of ASEAN countries into China's production chain. We haven't been involved in that business for a long time; that is, infrastructure—heavy infrastructure. That said, however, provided that infrastructure projects, excluding these mainstream dams, and activities are not exploitative or environmentally destructive, the expansion of trade investment ties between China, its Mekong and ASEAN neighbors can be a win-win situation for all. Unfortunately, at present, this is far from the case. What we can do, and have already accomplished to a surprising extent, is to use our expanded engagement in the region, as I would put it, to "keep China honest." You alluded already to the—and as did Deputy Secretary Yun—to the fact that China has become a bit more responsive to its neighbors' concerns; for instance, about what's going on in Yunnan, how much water was being released—whether it was filling or spilling—the

Xiaowan Dam, during the last drought. But, there's no transparency there. And that needs to change.

And more broadly, American reengagement with Southeast Asia, and our firmer stance regarding China's growing assertiveness in the South China Sea, have predictably been criticized by Beijing, sometimes in angry language. But, the main observable effect, to date, has not been an increase in regional tensions, but, rather, to cause Beijing to pay noticeably more attention to the concerns, fears, and interests of its neighbors. U.S. friends and allies in Southeast Asia welcome this trend, and they want more of it. This is a major achievement, and one that needs a strong and constructive followup by the administration and by the Congress.

In conclusion, rather than creating regional nervousness, the initial impact of American reengagement in the Mekong, and the wider Southeast Asia region, has been working to the benefit of peace and stability, as intended. Now is not the time to rest on these still tentative laurels.

Thank you, sir.

[The prepared statement of Dr. Cronin follows:]

PREPARED STATEMENT OF DR. RICHARD P. CRONIN, DIRECTOR, SOUTHEAST ASIA PROGRAM, STIMSON CENTER, WASHINGTON, DC

Mr. Chairman, thank you for the opportunity to offer my perspectives on the urgent issues regarding Water and Security in Southeast Asia. I have organized my statement so as to respond specifically to the five broad questions you posed as well as offering some additional observations that I think are relevant to your objectives in organizing this hearing.

Comparatively speaking, 30 percent of the world's fresh water is in Asia but it is very unevenly distributed. The South of China is well-watered but the north and west are extremely dry, as is Central Asia. Southeast Asia generally has ample water resources but with two important caveats: First, most of the region's rainfall occurs during the monsoon or wet season, which can be unreliable. Second, in the Mekong Basin a large portion of water available during the dry season comes from the spring and summer melting of the winter snowcap in Tibet. Nonetheless, the adaptation of flora and fauna to the extremes of wet and dry are the main reasons for the river's rich bounty and they are gravely threatened by hydropower dams, especially on the main stream and major tributaries. The conditions have made the Greater Mekong Region Subregion (GMS) a major wet rice growing region, with Thailand and Vietnam the world's first and second rice exporters.

Government policies and standards in Southeast Asia that address population growth, pollution, and industrial activity, and the impact on the region's water use and management.

To answer the first question you posed, most but not all Southeast Asian governments have generally done a better job of reducing population growth rates than protecting their forests from rampant destruction and rivers, estuaries, and other water resources from pollution and the unsustainable use of ground water. Most large coastal cities in Southeast Asia are sinking from the depletion of their aquifers, even as the threat of rising sea levels and exceptionally severe storms caused by climate change are beginning to be felt. Jakarta, Bangkok, Manila, Hanoi and Ho Chi Minh City are frequently flooded even by storms of common and predictable strength.

Unsustainable population growth remains an underlying cause of environmental degradation as well as political instability in some parts of the Mekong Basin, especially in upland areas which already are suffering from excessive exploitation. The comparatively youthfulness of most of the Mekong country populations ensures considerable growth momentum for some time after fertility rates decline to replacement level.

In Mekong Southeast Asia the population of Laos was growing at an estimated 2.73 percent per year as of 2007, with a very young age structure—41.2 percent of the population aged 14 years and under. Cambodia is growing more slowly at 1.73 percent per year, but Cambodians 14 and under still account for 34 percent of the population. The relevant figures for Vietnam are 1.04 percent growth and 26.3 per-

cent of the population at 14 or under. The Thai population is growing at well under 1 percent per year and only 21 percent of the population is 14 years or younger. Myanmar's growth rate has fallen from 2.5 percent in the mid-1970s to below 1.0 percent in 2008, no doubt due in part to the dim economic prospects for a population with a comparatively high level of literacy but forced to live under the misrule of the military junta.

Because of the still largely young populations of the Lower Mekong countries—besides Thailand—demographers estimate that the population of the Mekong Basin will increase from 73 million at present to about 120 million by 2025, an increase of 65 percent. Moreover, some areas are growing far more rapidly and unsustainably. For instance, the population around Cambodia's Tonle Sap Great Lake is growing three times faster than the rest of the Cambodian population. Incomes of people living around and even on the Tonle Sap not surprisingly are one-third of those of Phnom Penh and poverty is four times as high. Certainly rapid population growth is a major factor in poverty but so are development policies that unsustainable exploit the resources of the poorest citizens for the benefit of more politically important urbanites.

As often pointed by Southeast Asians, the United States, Europe, and other parts of the more developed world equally abused their resources until they were almost gone. The problem is that this historically factual argument glosses over some important differences between the industrial states of the northern hemisphere with developing Asia and Africa that are critically important. Europe long ago dammed all of its major rivers but the process took place over a couple of hundred years and occurred simultaneously with industrialization. The United States took a century to exploit the resources of a rich but comparatively lightly populated continent. The Native Americans paid a terrible price, of course, but until the closing of the frontier in the late 19th century Americans could always move on to somewhere else after local resources were exhausted. Today New England is more forested than in the early 19th century, but mainly because the whole basis of the economy has changed.

In contrast, the Greater Mekong River Basin (GMS), which some call "Asia's Last Frontier," offers no new rich western lands and some important natural resources such as timber that once seemed inexhaustible have been rapidly depleted, mainly by illegal cutting. Nor do many of the poorest Southeast Asian countries have the realistic potential for the kind of rapid industrialization that took place in Europe, North America and Northeast Asia to absorb people who lose their lands, fisheries, and livelihoods. In other words, the relentless expropriation of shared community water resources is not likely to have the same kind of positive outcome for the 60 million or so Lao, Cambodians, and Vietnamese (in the Mekong Delta) who will loose their livelihoods and food sources. These days, forests are destroyed as much to make way for rubber and palm oil plantations as for the timber. For maximum efficiency, these operations seek to minimize employment, and in the case of Chinese investments, labor is imported directly from China and the workers live in self-contained camps.

Hydropower development is even more detached from future employment opportunities and higher living standards. For a variety of reasons, starting with geography and inappropriate economic policies, industrialization and services industries are not likely to spring up to create new livelihoods for most of those displaced by the dams. The record thus far of relocating, compensating, and providing new lands and occupations of those displaced by hydropower dam projects gives no cause for optimism. Especially because of the particularly devastating impact of mainstream dams on fisheries and existing agriculture, the most likely consequence will be the spontaneous migration to cities, in some cases across borders, with the attendant social ills of increased squalor, crime and trafficking in drugs and human beings.

The political, environmental, sovereignty and regional security impact of China's water use and hydropower development along the upper Mekong River, and China's in regional water resources management.

The most important aspect of the Mekong in terms of water and security—both national and human—is that the river is a transboundary resource shared by six countries: China which controls the source and upper half of the river, and five downstream Southeast Asian countries—Burma/Myanmar, Laos, Thailand Cambodia, and Vietnam.

China's ongoing construction of a massive cascade of eight or more dams on the Upper Mekong in Yunnan and plans by Laos and Cambodia for 11 dams on the lower half of the River's mainstream epitomize the skewed nature of what passes for "development" in Chinese minds as well as in some quarters of the Asian Development Bank (ADB), the World Bank and the African Development Bank. Of course large to mega-sized dams generate much-needed electricity for cities and industries

and which tends to boost overall GDP growth, but at a huge cost to those who lose their forests, fisheries, and farms.

Dams on the main stem of any river are highly destructive of its core hydrology and the existing "environmental services" such as aquatic life and clean water for agriculture and drinking. The case of the Mekong River Basin is at the extreme end of the developmentenvironment dilemma. The Mekong is one of the most productive river basins in the world in terms of fish and agriculture, second only to the Amazon, which is 12 times its size.

Both upstream and downstream dam proposals have different impacts on the River's hydrology, ecology, morphology, and human security. I will begin by discussing China's hydropower development program in Yunnan Province, in the far southwest of the country.

CHINA'S YUNNAN CASCADE

The character and impact of the eight or more large to mega dams that China is building on the upper half of the river, which China calls the Lancang Jiang ("Turbulent River") and the dams proposed for the lower half of the river in Southeast Asia are different in important respects.

The main environmental impact of China's dams will be to capture much of the silt that flows down from the Tibetan Plateau with the spring snowmelt and late summer monsoon rains, thereby depriving downstream farmers of the annual nutrient renewal of their fields and denying the Mekong Delta that replenishment of silt necessary to keep the South China Sea at bay. China's Yunnan Cascade will also shift the timing of the seasonal monsoon "flood pulse" that triggers the spawning migration of many fish species.

Worst of all, the reservoirs of China's two biggest dams in the Yunnan cascade, the Xiaowan Dam that began filling last fall or winter and the Naozhadu Dam, now under construction, can hold 15 and 22 billion cubic meters of water respectively. This is more than one season's annual flow of the upper half of the river and it will give China the ability to regulate the river from Yunnan to the South China Sea. China plans to use this storage to put as much as 40 percent or more water into the river during the dry season in order to keep the smaller (but still quite large) dams running year-round and support navigation for large cargo boats between southern Yunnan and Luang Prabang, Laos, and for yet unrevealed plans for irrigation and possibly other water diversion schemes.

These plans to regulate the river to support navigation and changing power demands are extremely destructive environmentally and ecologically. Ever since construction was begun on the first dam at Manwan, which came on line in 2003, very erratic river flows have scoured river banks and destroyed dry season vegetable gardens, and even drowned villagers on river banks in northern Laos who were caught unawares by fast rising water from dam operations. Manwan, it should be pointed out, has only 1/15th the storage capacity of the Xiaowan Dam upstream. To be clear no more water can come down the river than can pass through the Manwan Dam's flood gates at a given time, but the whole point of building Xiaowan as a giant cistern is to keep Manwan and two other smaller dams operating year round.

Even more troubling, are the potential political and geopolitical ramifications of China's Yunnan cascade. Many citizens and even officials in the downstream countries blamed China for the last dry season extreme drought, the worst in 50 years. The drought was only broken when the monsoon rains returned this summer. China protested that it was also suffering from the same drought, but because it provided no data about the operation of its dam it was never certain whether the Chinese dams were spilling, filling, or passing along as much water as entered the reservoirs upstream.

TROUBLING DEPENDENCY

Even in "normal" years the dry-season flow of the Lower Mekong is too meager to generate hydropower. In many places you could walk most of the way from Vientiane, Laos to the Thai side of the river. If Laos and Cambodia in particular go ahead with their plans for damming the middle and lower reaches of the river they will make themselves dependent on China to release water from the Xiaowan Dam in the right quantity and at the right time to keep the turbines running for several months of the year.

Some officials from those countries have expressed confidence that China would never withhold water for any prolonged period for the practical reason that it needs to keep enough water flowing to keep its own southernmost dams generating power during the dry season. There are at least a couple of flaws with this theory. First, at times of prolonged drought China may not have enough water in the reservoir

to keep its own dams operating. This appears to have been what happened in the recent dry season, though in this case China had only begun to fill the Xiaowan Dam during the preceding rainy season.

In addition, in view of predictions that climate change will continue to cause the retreat of glaciers and the shrinking of the winter snowcap in Tibet, China may give higher priority in the future to storing water than producing power. Moreover, China is already considering the diversion of some Mekong water to the Yangtze River to make up for water it plans to redistribute from that river to the Yellow River in the bone dry North. The risk that China will engage in "water nationalism" is a real one, and a strong reason for not building Lower Mekong dams.

The challenges of proposed dam construction along the Lower Mekong River, and the impact on the region's environment, food security, sovereignty, and economic development.

The Lower Mekong is very different than most other important rivers of the world in that some 60 million people depend directly on, or indirectly, on its almost unparalleled bounty of fish and annual load of silt that replenishes otherwise nutrient-deficient soil. This food resource is not only of vital importance to local livelihoods, but the rice produced with the Mekong's waters in Thailand, Cambodia, and Vietnam's Mekong Delta is important to the global rice market. The people who depend on the river badly need to improve their standards of living and nutrition, but destroying the natural functions of the river is not the way to do this. Rather, the river and its bounty of fish and agricultural production have to remain the base of the Mekong counties' economic pyramid. Already hundreds of dams are operating, under construction, or planned for tributaries in the mountains of Laos, Vietnam's Central Highlands, and the higher elevations of Thailand and Cambodia.

The true cost-benefit ratio of many of these projects have been questionable, but they are of a different order altogether than dams on the mainstream that, if carried out as planned, would turn 90 percent of the lower half of the river into a series of nine or more slow moving lakes, connected by stretches of fast moving but highly variable channels and cascades that cannot support life.

The effectiveness of existing regional mechanisms for managing water resources in Southeast Asia and options for improving regional water resources management.

The current incarnation of the Mekong River Commission (MRC) was created in 1995 when four of the lower Mekong countries signed The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin. This agreement established norms for water use, flow maintenance, environmental protection, and areas of cooperation, to name a few. It eventually led to the establishment of four institutional goals for the MRC: To promote and support coordinated, sustainable, and propoor development; to enhance effective regional cooperation; to strengthen basinwide environmental monitoring and impact assessment; to strengthen the Integrated Water Resources Management capacity and knowledge base of the MRC bodies, National Mekong Committees, Line Agencies, and other stakeholders.

The Mekong River Commission provides a valuable scientific research resource and an institutional structure for cooperative water management for the four Lower Mekong countries. Unfortunately, the MRC mechanism has made little real progress toward the goal of fostering cooperation. There still are no enforceable rules and MRC countries seem unlikely to adopt them under current circumstances. Moreover, the MRC is ultimately an advisory body, with no independent legal authority to coordinate, plan, or oversee projects—under the current situation, these remain sovereign prerogatives.

Because of a long term lack of trust among the Lower Mekong countries, concerns about sovereignty and the high priority given to the exploitation of "national" resources for development, one country's interests often are almost inevitably in conflict with those of its neighbors or the region as a whole. Moreover, the goal of truly cooperative, equitable, and sustainable use of the Mekong is largely moot as long as China, along with Burma/Myanmar, has declined to join the MRC. Beijing refuses to share either significant information about its dams or the data that it used in or derived from its own environmental and hydrological studies. Even more troubling, China thus has refused to countenance making cooperative water management of the ADB-led Greater Mekong Subregion (GMS) cooperative development program. Instead the GMS has focused on crisscrossing the Mekong Basin with roads, bridges, and even a regional electric power grid, without including the river that gives the region its name.

The United States policy toward water resources management in Southeast Asia, particularly along the Mekong River, existing U.S. Government efforts to promote im-

proved water resources management; and options for the United States to play a more constructive role in addressing these challenges.

Mr. Chairman, the Obama administration has made the Mekong Basin the focal point of its professed reengagement with Southeast Asia and ASEAN, and not a moment too soon. Of course the United States never really left the region, especially in regard to our military capabilities and engagement in East Asia and the Pacific, but it has been widely accepted that especially after 9/11 the United States was distracted, and tended to make antiterrorism cooperation the focal point of its regional engagement. An effort to rebalance U.S. engagement was begun late in the second George W. Bush administration, but the Obama administration has greatly expanded the policy qualitatively, and has begun to mobilize additional budget resources to expand our involvement more substantively. We have a long way to go and need to mobilize the resources, expertise, and capabilities of a wide variety of departments and agencies as well as leverage our important positions on the boards of the ADB and World Bank.

LOWER MEKONG INITIATIVE (LMI)

With the approval of the four MRC countries Secretary of State signaled U.S. reengagement with the region by signing a Letter of Intent (LOI) for cooperation with the CEO of the Mekong River Commission, Jeremy Bird, at the annual ASEAN Foreign Ministers meeting which was hosted by Thailand at Phuket in July 2009. Initially the concept involved a sister river partnership between the MRC and the U.S. Mississippi River Commission. What the State Department now calls the Lower Mekong Initiative (LMI) has great potential but some important ongoing limitations.

All of the Lower Mekong countries understand the geopolitical nature of the U.S. initiative, most especially China, and to varying degrees and the exception of China, they all welcome it in varying degrees. Because of the wider context of enhanced U.S. engagement with ASEAN, the LMI has also been welcomed by most Southeast Asian countries, all of whom worry about China's hegemonic potential both in mainland Southeast Asia and the South China Sea.

For the same reasons the administration's decision to approve the ASEAN Treaty of Amity and Cooperation (TAC) and apply for membership in the East Asian Summit (EAS) have also been widely applauded, as has Secretary of State Clinton's declaration at this years ASEAN Foreign Ministers' meeting in Hanoi that we have important interests in the South China Sea and that our position on the maritime territorial disputes is that boundaries of 200 mile Exclusive Economic Zones (EEZ's) should be anchored on the shore. Effectively, the Obama administration has aligned itself with the principles of the UN Convention on the Law of the Sea, and against China's claim to most of the South China Sea on the basis of a historical presence.

One important limitation of the LMI at present is that the initiative originated in the Bureau of East Asian and Pacific Affairs. This was a foreign policy initiative not backed by much in the way of programs or funding. Though it was intended to cover the areas of health, education, climate change, and infrastructure, the main agency involved besides the State Department was the U.S. Geological Survey, which had already initiated the Mississippi-Mekong Partnership with Vietnam's Can Tho University.

The substance of the LMI shows the strengths and weaknesses of the American governmental structure. On the one hand, many departments and agencies have already been involved in activities that support the LMI objectives, especially much-needed human capacity-building and education. On the other hand, these activities still are not coordinated in any meaningful way. Moreover, in the absence of strong coordination, too much depends on the individual enthusiasm and leadership of government officials to generate ad hoc cooperation. Officials come and go, and senior bureaucrats have strong influence over department and agency priorities and often legislative mandates for much of their budgets.

Mainly by rebranding existing USG efforts the State Department identified by the latest count about $200 million for FY 2010, mainly in the form of environment-climate change, health, and education and training. Some other activities already underway show the wide array of support the administration and Congress could generate through a concerted approach. For instance, the Corps of Engineers, presumably under its own international agenda, has brought senior officials from the Lower Mekong countries and possibly China to visit Columbia River dams, where they had the opportunity to learn first hand about the high cost and limited success of fish ladders and other means to move salmon around dams that block their spawning runs. Corps representatives have even participated in MRC "stakeholder consultation" meetings to explain that fish ladders and "fish ways" are not practical on the Mekong River.

USAID has ongoing programs on climate change adaptation. The Education Department and the Center for Disease Control have long had programs in the LMI countries.

Recently a colleague and I have even participated in programs on mainstream hydropower issues for Mekong country officials and NGOs under the State Department's International Visitor Program.

Infrastructure remains a blank space in the four LMI pillars, probably because there were no existing programs that could be rebranded. This is an area where the United States could be providing technology and capacity-building, especially in the modeling, river monitoring, and full scope cost-benefit analysis of proposed dam and other infrastructure programs. Nonetheless, Secretary of State Clinton has repeatedly emphasized her concern about Mekong fisheries, food and human security and the future of the Mekong Delta.

On the technology side, the Commercial Service of the U.S. Commerce Department and the EX–IM Bank can help promote relevant U.S. technology, including sensing technology for river flows, changes in silt loads, and pollutants, as well as alternative energy like efficient gas-fired thermal power plants.

Both Thailand and Vietnam are already exploring the possibility of acquiring U.S.-designed third generation nuclear power plants, namely Westinghouse's Passive Core Cooling Systems (PCCS) which are not dependent on large amounts of river water. The technology is licensed to a South Korean company but Westinghouse still supplies important reactor and control components. Obviously there are a host of issues about nuclear power, starting with proliferation risks and safe spent fuel disposal, but increasingly even environmentalists are coming around to the view that modern nuclear power could be preferable to coal and other thermal power. Solar and wind power also have considerable potential in Southeast Asia but China is likely to emerge more competitive than the United States in these areas of applied technology.

URGENT NEED FOR PLANNING AND COORDINATION

The most urgent need is planning and coordination, especially for getting adequate funding in place for FY 2012. I'm not sure where these functions should be located, whether in the State Department or elsewhere. At present the EAP Bureau has neither the staff nor the funding to accomplish this task. USAID would be a possibility, but only with a designated program and adequate staff and funding. Putting the coordination responsibility might—and I emphasize might—also make sense because USAID operates under the general policy direction of the State Department.

Many departments and agencies could give more substance to the LMI, and in fact many of them are already involved in some way with the Mekong River Commission and individual governments. An inclusive list could include, in alphabetical order: The U.S. Agency for International Development (USAID), Army Corps of Engineers, Centers for Disease Control and Prevention (CDC), the USDA and its National Institute of Food and Agriculture and Foreign Agricultural Service (FAS), Departments of Commerce, Education, and Energy, Export-Import Bank (EX-IM), U.S. Geological Survey, Health and Human Services (HHS), and the National Oceanic and Atmospheric Administration (NOAA).

The United States should also be leveraging its influence and voting power on the boards of directors of the ADB and World Bank to jointly support specific LMI programs or program objectives. Both banks have been putting the mantle of poverty reduction over projects that may ultimately impoverish more people than they help. In my view and that of many other observers, it's past time for the United States to push harder for projects that aim to raise the incomes and improve the lives and health of the poorest and the most natural resource-dependent populations where they live.

At the same time, the United States Executive Directors to the Banks should be instructed to oppose egregious hydropower projects, especially mainstream dams which do not meet World Bank and World Commission on Dams criteria. Neither the ADB nor the World Bank can get directly involved in constructing mainstream dams on the Mekong because their extremely environmental and socioeconomic impacts are too severe to pass muster with the Banks' own criteria.

"KEEP CHINA HONEST"

Finally, Mr. Chairman, the United States should not, cannot and does not seek to compete with China for infrastructure assistance or obstruct the growing economic integration of the ASEAN countries into China's production chain. We haven't been involved in infrastructure development assistance for decades and are not like-

ly to become so in the future. For better or worse—mainly for the worse—most of these dam projects are being carried out by commercial developers and commercial or state-owned banks. That said, however, provided that infrastructure projects and activities are not exploitative or environmentally destructive, the expansion of trade and investment ties between China and its Mekong and ASEAN neighbors can be a "win-win" situation for all. Unfortunately, at present this is far from the case.

What we can do—and have already accomplished to a surprising extent—is to use our expanded engagement with the region to "keep China honest." U.S. naval and other military power combined with our still potent "soft power"—political, economic, and cultural—still counts for enough to influence our friends and worry China.

Interestingly, while a few observers from Southeast Asia have worried that the region could be caught in the middle of a growing United States-China rivalry, most regional leaders and observers welcome the asymmetrical balancing role that the U.S. provides. While American reengagement with Southeast Asia and our firmer stance regarding China's growing assertiveness in the South China Sea have predictably been criticized by Beijing, some times in angry language, the main observable effect to date has not been an increase in regional tension. Rather, the most important effect has been to cause Beijing to pay noticeably more attention to the concerns, fears and interests of its neighbors. This is a major achievement and one that needs a strong and constructive followup by the administration and Congress.

In conclusion, rather than creating regional nervousness, the initial impact of American reengagement in the Mekong and the wider Southeast Asia region has been working to the benefit of peace and stability, as intended. Now is not the time to rest on these still tentative laurels.

Thank you, Mr. Chairman for giving me this opportunity to share my views with the committee. I will be glad to answer as best I can any questions you may have, either orally now or in writing later.

Senator WEBB. Thank you, Dr. Cronin. I fully agree with the final statement that you made. I was very gratified to see China beginning to move forward with some cooperation here, although it has, as I mentioned earlier, been extremely hesitant to deal with sovereignty issues; and this is a sovereignty issue——

Dr. CRONIN. Yes.

Senator WEBB [continuing]. It's a water sovereignty issue on—other than on a bilateral basis. So, there is some room for hope there.

And, Ms. Imhof, welcome.

STATEMENT OF AVIVA IMHOF, CAMPAIGNS DIRECTOR, INTERNATIONAL RIVERS, BERKELEY, CA

Ms. IMHOF. Thank you, and good afternoon.

Mr. Chairman, thank you for the opportunity to testify before you today on the risks to the Mekong River Basin.

My organization, International Rivers, and I, personally, have been involved in monitoring hydropower developments along the Mekong River for the past 15 years. We've documented the impacts of existing dams and advocated for the rights of the 60 million people who depend on the Lower Mekong River for their livelihoods. And in a region, as you can imagine, that is riddled with nondemocratic governments, it's not an easy task.

As we've already heard, the Mekong River is one of the world's great river basins. And we've heard about the importance of fisheries to people's livelihoods, and the importance of fish migrations, and the fact that dams block the migration fish, and the enormous impacts that that will have on the ecosystem and livelihoods.

We've also heard about China's plans to build a cascade—or, they're currently building the cascade of eight dams on the Upper Mekong. So, I won't talk about that.

What I will talk about is that—you know, I want to go through a little bit about the dam plans for the region, first, and then the impacts that that will have.

Laos, which contributes about a third of the Mekong's flow, is undergoing a dam-building boom. The government's signed deals with foreign investors to build more than 50 dams on Mekong tributaries, mostly for sale of power to Thailand and Vietnam. Laos is also considering 10 projects on the Mekong mainstream. Right now, it sells power from eight projects to Thailand. And we've spent a long time documenting the impact of these projects—they're all on Mekong tributaries—the impacts to people's livelihoods. And over 100,000 people right now are suffering the impacts from existing dams on Mekong tributaries in Laos and have not been adequately compensated for their losses. Sometimes, it's been 10 years that people have been suffering impacts and haven't been compensated. And a number of these projects have been funded by the Asian Development Bank. So, it's very timely that you're introducing legislation to deal with the issue of Asian Development Bank-funded dams.

And one of the big concerns, of course, is that, with all these tributary projects that are already having an impact on people's livelihoods—these are smaller projects than the mainstream dams—if Laos can't even ensure that these projects have adequate mitigation and compensation mechanisms for affected communities, then how on earth are we going to deal with this—these massive mainstream dam projects that will have even greater impacts?

Vietnam also has plans to build up to 48 new dams by 2025, many of which are already under construction. And, here again, we find that dam cascades are being built on two major Mekong tributaries, the Se San and the Srepok, the impacts of which are being experienced by more than 55,000 villages living downstream in Cambodia who, today, have not received compensation for their losses.

Cambodia has also committed to an extensive domestic hydropower development program, mostly financed with the support of the Chinese Government, and they're considering two dams, also on the Mekong mainstream in Cambodia.

And meanwhile, in Thailand, where there is more political space, Thailand has faced such huge opposition to dam construction in the past that it's basically looking to import electricity from neighboring countries, rather than to build more dams in its own territory, because it knows it would face too much opposition.

So, I want to now discuss the regional planning and policy context and how this affects water resources development in the Mekong Basin. As this committee would be aware, and as you are aware, the Mekong region's political context is challenging, with a number unaccountable and undemocratic regimes. While, on paper, some of the national laws regarding water resources development in the region are progressive, there is a great gap between policy and practice. And I believe you also noted this in your opening statement.

In Laos, Cambodia, and Vietnam, hydroconcessions, including those on the Mekong mainstream, seem to be given out to any interested developer on a first-come-first-served basis without any

attention paid to basin development planning processes or the reputation of the company involved. Even where laws are strong—even where strong laws are in place on paper, they're often not followed in practice. Like environmental impact assessments are often not released before a dam is given an approval for construction in violation of domestic laws. And weaknesses in government capacity in Laos and Cambodia particularly exacerbate the problems with regulation and enforcement.

And this week, institutional and regulatory framework has been compounded by changes to the regional investment environment for hydropower development. Today, energy construction companies from China, Vietnam, Thailand, and Malaysia are developing, funding, and building large dams. Thai and Chinese companies and financial institutions, such as Thai EXIM and China Eximbank, are becoming particularly prominent in developing and funding hydropower projects in the region, as are Thai and Chinese private banks. And these new actors are yet to adopt any international social and environmental standards in their operations, which leads to poor planning processes and even poorer project outcomes.

I want to focus now specifically on plans for the Lower Mekong mainstream. As we've heard, there are plans for a cascade of 12 large dams on the Mekong River's mainstream, and most of the power would be sent to Thailand and Vietnam. In total, the dams would transform two-thirds of the length of the Lower Mekong River into a series of reservoirs that would require the resettlement of at least 88,000 people. And in order to assess the implications that this cascade would have on the Mekong River's ecology and economy, the Mekong River Commission commissioned a Strategic Environmental Assessment of the proposed mainstream dams. Conducted over a period of 15 months, the SEA team has just delivered its final report to the Mekong Secretariat. And this really is the first-ever comprehensive, cumulative impact assessment of dam construction on the Mekong mainstream, so it's a very significant report. And what the SEA does is, it highlights the significant environmental, social, and economic impacts that the dams are expected to have, while also warning of the skewed cost-benefit distribution likely to occur.

The SEA warns that the decision to move forward with just one dam alone would result in permanent and irreversible changes to the Mekong River ecosystem. The projects, as a whole, would impact more than 40 million people, an incredible number of people, who rely on the Mekong River for their livelihoods and food security.

Just a few of the impacts mentioned in the SEA's impact assessment report: Through blocking fish migration routes and changing the water quality and quantity of water, the dams would cause fishery losses of between 700,000 and 1.4 million tons each year, which is estimated to be worth between around $500 million and $1 billion. In turn, the livelihoods and food security of millions of people would be impacted, and there's a consensus amongst fisheries scientists in the region that these impacts cannot be mitigated. There's no technology available to mitigate these impacts to fisheries.

The dams would also impact the immense biodiversity of the Mekong River. Important critically endangered species, such as the Irrawaddy dolphin and the giant Mekong catfish, would likely be driven to extinction. The dams would flood key biodiversity zones, national protected areas, and Ramsar wetlands sites, impacting terrestrial and aquatic habitat for fauna and flora. And more than half of the Mekong's riverbank gardens would be inundated by the dams and damaged by daily water fluctuations. This would result in lost income generation of between $18 and $57 million, while also affecting food security by reducing household vegetable consumption.

And finally, as we've heard a little bit, today the reduction of sediment flow in the Mekong River would have serious consequences for Cambodia's flood plains and great lakes system, along with the Mekong Delta in Vietnam. And, of course, these impacts would be compounded by climate change, as well.

The SEA team also finds that the economic benefits of the projects would accrue mostly to the private developers and contractors building the projects, and that the projects would actually have relatively little impact on power supply for Thailand and Vietnam, the two major consumers of electricity. So, basically, as we can see, the projects would have a massive impact and then wouldn't actually even add much, in terms of meeting regional energy needs.

These findings have led the SEA team to recommend that all decisions on Mekong mainstream dams be deferred for a period of 10 years, and that this period of time be used to examine alternative nondam options for generating electricity from the Mekong mainstream, as well as to improve the understanding of the river basin's ecology and potential impacts of the projects.

So, the question now facing the region's governments and the Mekong River Commission is whether they will adopt the recommendations of the SEA. And unfortunately, Mr. Chairman, the writing on the wall is not good. We've heard, from some sources, that the MRC, because it doesn't like the conclusions of the SEA, is attempting to distance itself from the SEA recommendations and to move forward with some of the dams.

And, very significantly, just yesterday it was announced that the Government of Laos has submitted official notification to the MRC for the Xayaburi Dam on the Mekong mainstream, which would be the first dam that's being proposed to be built on the Mekong mainstream. And this will trigger the MRC's consultation process with regional governments. And they're expecting a decision to be made within 6 months. The MRC is likely to allow this consultation process to go forward, despite the fact that the SEA report hasn't yet been released publicly, hasn't been translated into regional languages or considered by regional governments, nor has its finding been incorporated into the Xayaburi EIA.

So, to allow the Xayaburi consultation to go forward without considering the findings of the SEA would be like getting a diagnosis of cancer and then ignoring it. Mr. Chairman, this must not be allowed to happen.

Which brings me to the final part of my presentation, which is, What can the United States do to avert disaster on the Mekong?

As a first step, the U.S. State Department, in its role as a donor to the Mekong River Commission and to regional governments, should push for the SEA report to be publicly released and endorsed by the MRC and member countries before any consultation process on an individual dam, like Xayaburi, be initiated. The United States should help push for the SEA's recommendations to be followed, which means deferring decisions on mainstream dams for at least 10 years. The United States could offer the assistance of the U.S. Geological Survey in generating more comprehensive data sets on the river's hydrology, ecology, sediment flows and water quality, and ensuring that this information is released in the public domain. The U.S. State Department should continue to voice its concerns over the security risks these dams pose, and continue its work in highlighting the importance of regional food security and the role that fisheries plays in the region.

Finally, we believe that, through providing support and training for better energy planning processes, such as integrated resources planning, which is a technique used by a lot of U.S. utilities, coupled with technical assistance and startup funds for investment and energy efficiency and clean, renewable energy sources, the United States could play an instrumental role in pushing for a clean energy future for the Mekong region, allowing the Mekong River Basin to be preserved for future generations.

Chairman Webb, thank you again for the opportunity to contribute to this important debate.

[The prepared statement of Ms. Imhof follows:]

PREPARED STATEMENT OF AVIVA IMHOF CAMPAIGNS DIRECTOR, INTERNATIONAL RIVERS, BERKELEY, CA

Mr. Chairman, Senator Inhofe and members of the committee. Thank you for the opportunity to testify before you today on the risks to the Mekong River Basin and its inhabitants from the construction of large dams.

My organization, International Rivers, and I personally, have been involved in monitoring hydropower developments along the Mekong River for the past 15 years, documenting the impacts of existing dams built in the Basin and advocating for the rights of the 60 million people who depend on the lower Mekong River Basin for their livelihoods. In a region that is riddled with nondemocratic governments, this is no easy task.

The Mekong River is one of the world's great river basins. The river still flows freely for most of its length; until recently the region's years of war and instability had protected the river from massive dam construction.

Seventy different ethnic groups live in the Mekong Basin and their livelihoods and cultures are intimately connected with the river's natural cycles. The river boasts one of the world's most diverse and productive inland fisheries, in some areas supplying the people of the region with up to 80 percent of their protein needs. Whether it's the Tonle Sap or Great Lake of Cambodia—the country's fish basket—or the tropical wetlands of the Mekong Delta—the rice bowl of Vietnam—the river sustains the people and ecosystems of the region.

The Mekong River is second in biodiversity only to the Amazon, home to up to an estimated 1,500 different species of fish. By comparison, the Mississippi River in the United States—also recognized for its high biodiversity—has only 241 fish species. Included amongst the Mekong's aquatic biodiversity are such emblematic and threatened species as the Mekong Giant Catfish—a species that grows up to 9 feet in length and weighs up to 600 lbs—the endangered Irrawaddy freshwater dolphin, and the world's largest freshwater fish, the giant freshwater stingray. The Mekong's fisheries are highly migratory—at least a third of Mekong fish species migrate between the mainstream and its tributaries, including 70 percent of the commercial fish catch. Migrations are timed to coincide with the Mekong's annual monsoon pulse.

The Mekong supports the world's largest inland fishery, with approximately 2.6 million tonnes harvested annually from the Lower Mekong Basin. By some esti-

mates, this amounts to close to 20 percent of the world's freshwater fish yield. At first catch, the Mekong's wild-capture fisheries have an estimated value of US$2–3 billion. By the time fish-based products have been transported, processed, and marketed to the final consumer, the fish are estimated to be worth between US$5.6 and $9.4 billion. In comparison, although the Mississippi River is nearly as long as the Mekong, its commercial fishing generates only 0.1 percent of the Mekong's first-catch fish value. The revenues generated from wild-capture fisheries and fish trade make a significant contribution to the Gross Domestic Product (GDP) of each Mekong country. Eight percent of Lao's GDP and 16 percent of Cambodia's GDP can be traced to fisheries.

FOOD SECURITY

Fish are extremely important to food security in the Mekong Basin. Fish consumption in mainland Southeast Asia far exceeds most other places in the world. Per year, the average person in the Lower Mekong Basin eats 56.6 kilograms of freshwater fish products. This is over two times the average total fish consumption in Europe and America. In every Mekong country fish are the most important source of animal protein. Although the amount of animal protein from fish varies—from an average of 60 percent in Vietnam to as high as 79 percent in some Cambodian villages and 78 percent in the Khong district of Lao—it is well-established that fish protein is important to food security throughout the region. Fish are also an essential source of vitamins and minerals, helping to ward off the nutritional deficiencies that are sadly still too common.

Fisheries are not the only important food source provided for by the Mekong. The Mekong River also supports a productive agricultural sector. The deposition of rich alluvial silt on the floodplains during the wet season allows for highly productive floodplain agriculture. The Mekong Delta in Vietnam—one of the most densely populated areas on Earth, and one of the most productive, is known as the rice bowl of Vietnam. The Delta produces upward of 16 million metric tonnes of rice annually, enough to feed about 77 million Vietnamese for a year. The Delta also supports highly productive shrimp farms, orchards and market gardens. Floodplains throughout the Mekong Basin allow for highly productive wet season rice farming with a minimum of artificial fertilizer or pesticides. In addition, many Mekong residents grow vegetables on the riverbanks in the dry season, which are an important source of income and food.

MEKONG UNDER THREAT

Yet this beautiful, dynamic and thriving river system is under threat. China is building a cascade of eight dams on the Upper Mekong in Yunnan province. Four of these projects have already been completed, and at least two more are under construction. The projects are being developed without any consultation with downstream countries and without any publicly available studies on their potential downstream impacts. Limited environmental impact assessments have only recently been made available within China for some of these projects, although only after the dams have now been built, and there has been no comprehensive assessment of the cumulative impacts of these projects on the ecology and hydrology of the Mekong River in downstream countries.

Academics have linked changes to the Mekong River's daily hydrology and sediment load since the early 1990s to the operation of the Upper Mekong dam cascade. Since the mid-1990s, communities downstream in Northern Thailand, Burma, and Laos have suffered from a loss of fish and aquatic plant resources, which have impacted local economies and livelihoods; and since the second project, Dachaoshan, was completed in 2003, local people have been reporting a 50-percent decline in fish catch. They also report serious erosion downstream and significant fluctuations in river levels caused by dam operation. These impacts will be magnified greatly as the larger projects in the cascade are completed and their reservoirs filled. The upper Mekong dams will store water in the wet season for release in the dry season, causing significant changes to the lower Mekong's flow regime, and impounding crucial sediment that will no longer flow downstream to fertilize the floodplains.

But China is not the only country with massive dam plans. Laos, which contributes about a third of the Mekong's flow, is undergoing a dam-building boom. In its bid to become "the battery of Southeast Asia," the government has signed deals with foreign investors to build more than 50 dams on Mekong tributaries, and is considering 10 projects on the Mekong mainstream. Power from these projects would be sold to neighboring Thailand, Cambodia, and Vietnam. Laos already sells power to Thailand from eight hydropower projects. While not all of the proposed projects for Laos will move forward, those that do will have serious impacts on the health of

the river ecosystem and the livelihoods of hundreds of thousands of Laotians who depend on rivers for fish, agriculture, water supply, transportation and other aspects of their lives.

Vietnam also has plans to build up to 48 new dams by 2025, many of which are already under construction. Dam cascades are being built on two major Mekong tributaries, the Se San and Srepok Rivers, the impacts of which are being experienced by ethnic minorities living in Vietnam and by Cambodian villagers living downstream. Vietnam has paid no compensation to the tens of thousands of Cambodians living downstream who have been affected by the Yali Falls Dam and four other projects on the Se San River. Approximately 55,000 people have suffered from daily erratic water fluctuations, widespread flooding, illness due to poor water quality, loss of riverbank gardens, and diminished fish stocks. Dam-induced flooding has killed at least 39 people. While the downstream impacts were acknowledged by the Vietnamese Government in 2000, there has been little progress in addressing these impacts.

Cambodia has also committed to an extensive domestic hydropower development program, financed with the support of the Chinese Government and facilitated through the technical expertise of Chinese construction companies. To date, deals have been reached on five major hydroelectric projects outside of the Mekong basin, and at least 9 dams in the Mekong Basin are being studied. In justifying its hydropower program, the Cambodian Government claims it is trying to balance the need for environmental and social protections against the need for electricity to support its economic development. Civil society groups in Cambodia, however, have expressed concern over the loss of Cambodia's natural heritage and questioned the approval process, which has been conducted behind closed doors without the participation of local communities and other concerned stakeholders.

Thailand, meanwhile, has faced such huge opposition to dam construction within its borders that it is looking to import electricity from neighboring countries rather than face the inevitable battles that would occur were it to propose additional dams in Thai territory.

THE REGIONAL PLANNING AND POLICY CONTEXT

I want to now discuss the regional planning and policy context and how this affects water resources development in the Mekong Basin. As this committee would be aware, the Mekong region's political context is rather challenging. Laos and Vietnam are still ruled by one-party Communist regimes. Thailand's democracy has been under repeated attack the past few years, and Cambodia, while theoretically a democracy, has been ruled by Hun Sen for the past 25 years. Burma, meanwhile, continues to suffer under the rule of a military dictatorship.

The Mekong River Commission (MRC) is a river basin management organization directed by the governments of Cambodia, Laos, Thailand, and Vietnam. Significantly, China is not a member of the MRC. Today the agency survives on international donor aid from the World Bank, Australia, Denmark, Finland, France, Japan, Sweden, and the United States, amongst others. The MRC has struggled over the years to define its role in managing the Mekong Basin since it has no real decisionmaking authority over government development plans, and since the 1995 Mekong Agreement, which acts as the organization's Constitution, does not allow any government or entity to veto another government's plans for development on its portion of the river. Therefore, the MRC's role has been relegated to one of coordination amongst member countries, as well as conducting important research and data management activities. In recent years, the member governments have been pushing for the MRC to take on more of a role as a river basin development organization, rather than a river basin management organization, with serious consequences for how the organization is responding to plans for regional developments. I will come back to the MRC below.

While on paper some of the national laws regarding water resources development in the region are somewhat progressive, influenced by donor agencies such as the World Bank and Asian Development Bank, there is a great gap between policy and practice.

In Laos, where the lion's share of dams are being planned, laws and policies surrounding hydropower development have improved over the past few years, but the country still lacks an overall planning process for hydropower development. Hydro concessions, including those on the Mekong mainstream, seem to be given out to any interested developer on a first-come, first-served basis, with little apparent concern for basin planning processes or the reputation of the company involved.

Many Lao laws, regulations and policies contain important provisions to ensure participation, consultation, information disclosure, compensation and resettlement

with livelihood restoration for affected communities. However, in practice, these provisions are often not followed, or are implemented on an ad hoc, case-by-case basis depending on the will, expertise and resources of the environmental and social consultants and the dam developer. The government's environmental regulator, the Water Resources and Environment Agency, lacks the authority, staff and resources to comprehensively review the significant number of proposed hydro projects and monitor them during construction and operation to ensure compliance with Lao laws and regulations. Decisions about whether or not to proceed with a project appear to be made exclusively the Ministry of Energy and Mines and the Ministry of Planning and Investment.

The situation is similar for Cambodia. While Cambodia on paper has a number of strong laws that should safeguard the environment and ensure adequate protection for affected communities, in practice their effectiveness is limited due to inadequate resources and, on occasion, institutional disincentive. Enforcement of Cambodia's laws is very weak. For example, even though Cambodian law requires an EIA to be completed for a dam project before approval, in reality a few dams have recently been approved apparently without an EIA. Cambodia still lacks any law governing resettlement of populations. And the endorsement by senior Cambodian politicians of extensive hydropower development plans has signaled to the government's bureaucracy that these projects should be pushed through.

A similar situation exists in Vietnam, where the Ministry of Industry and Trade makes decisions on projects before the Ministry of Natural Resources and Environment (MONRE) has appraised their environmental and social impacts and mitigation plans. The Vice Minister of MONRE, Nguyen Thai Lai, was recently quoted in the Saigon Times as stating that "In reality, our current appraisal procedures face many obstacles, because investors only send their project documents to MONRE for appraisal after they were already approved by the Ministry of Industry and Trade. . . . Mitigation plans may either be neglected or poorly presented." For example, in the case of the massive Son La Hydropower Project being built in the North of the country, which is displacing more than 91,000 people, the final approval of the project's EIA occurred in 2007 while formal construction started in 2005.

Civil society groups and energy analysts have also questioned Thailand and Vietnam's power development plans, which heavily promote the development of new large-scale electricity generation plants, such as fossil-fuel fired power stations and hydropower dams, and that are increasingly locking the region into a centralized electricity supply model. They claim that future electricity demands are overestimated, and that the potential that investment in energy efficiency measures, renewable energy, and decentralized energy options could play are downplayed, especially in the more industrialized cities of Thailand and Vietnam. They argue that existing plans mostly serve the interests of the state-owned electricity utilities, energy companies, and the construction industry, rather than the needs of the regions' electricity consumers.

The weak institutional and regulatory framework in the region has been compounded by changes to the regional financial investment environment for hydropower development. Traditional actors in supporting energy development in the region such as the World Bank and Asian Development Bank are becoming increasingly marginalized and instead, energy and construction companies from Vietnam, China, Thailand, and Malaysia are developing, funding, and building large dams. Armed with the support of private banks from their own countries and the promise of government guarantees through their export-import banks, these dambuilders are fast displacing the western corporations and multilateral banks that previously dominated the region's hydro scene.

Thai and Chinese companies and financial institutions are becoming particularly prominent in developing hydropower projects in the region. While the Thai Exim Bank is an increasingly keen supporter of hydropower projects in the region, it does not have an environmental policy and its activities are generally unaccountable to civil society. Thai Exim Bank has not yet adopted the Common Approaches on Environment and Officially Supported Export Credits, agreed upon by OECD countries, which outlines environmental and social standards for export credit agencies. Thai commercial banks are also willing financiers of major energy projects, but none have yet signed up to the Equator Principles, a set of voluntary environmental and social standards that have been adopted by more than 60 private banks around the world.

The China Export-Import Bank, China's official export credit agency, is also becoming an important player in the Mekong region, as are a number of China's major State Owned Enterprises, often with the Bank's financial backing. China Exim is closely aligned with the strategic overseas interests of China's Government, on whose behalf it may offer concessional loans and export credits, especially in implementing China's "Going Out" policy. For example, Chinese companies are involved

in developing four of the proposed Mekong Mainstream Dams: three in Laos and one in Cambodia, and Chinese companies are developing a series of hydropower projects on tributaries in Cambodia and Laos.

Most of these new actors are yet to adopt international social and environmental standards in their operations, leading to poor planning processes and project outcomes.

MEKONG MAINSTREAM DAMS

I now want to focus specifically on the plans for dams on the Lower Mekong Mainstream. Until now, the lower Mekong mainstream has remained free-flowing, one of the last great river basins of the world to be relatively unaffected by massive dams and diversions. Yet since mid-2006, Thai, Malaysian, Vietnamese, Russian, and Chinese companies have been preparing detailed studies for a cascade of 12 large hydropower dams on the Mekong River's mainstream. Eight of the dam sites are in Laos, two are in Cambodia, and two are on the Thai-Lao border. Most of the power generated would be sent to energy-hungry cities in Thailand and Vietnam.

In total, the dams would turn about half of the river between Northern Laos and Central Cambodia into reservoirs that, according to official estimates, would require the resettlement of at least 88,000 people.

In order to assess the implications that this cascade of dams would have on the Mekong River's ecology and economy, the Mekong River Commission (MRC) commissioned a Strategic Environmental Assessment (SEA) of the proposed mainstream dams. Conducted over a period of 15 months, the SEA team has just delivered its final report to the MRC Secretariat. The Assessment was carried out by an Australian consulting company, the International Centre for Environmental Management, and comprised a series of studies, intensive program of consultations, and detailed expert analysis of the issues associated with developing hydropower on the Mekong mainstream. As such, the Strategic Environmental Assessment represents the first ever comprehensive cumulative impact assessment of dam construction on the Mekong mainstream, helping to provide a broader understanding of the costs and benefits involved with building mainstream dams.

The SEA highlights the significant environmental, economic and social impacts the dams are expected to have, while also warning of skewed cost benefit distribution likely to occur. The SEA warns that the decision to move forward with just one dam alone would result in permanent and irreversible changes to the sustainability of the river system's productivity, which in turn would impact millions of people who rely on a healthy river for their livelihood and food security.

The following are some of the key impacts mentioned in the SEA's Impact Assessment:

Altering the Flow and Nature of the River: The dams would transform 66 percent percent of the length of the Lower Mekong into a series of stagnant reservoirs and sections of rapidly fluctuating water flows downstream of the dams. These changes would irreversibly change the natural flow of the river.

Impacts to Fisheries and Food Security: The dams would block vital fish migration routes, disrupt flood pulses, reduce wetlands, and change habitat necessary for the Mekong fisheries. These changes would result in significant fishery losses of between 700,000 to 1.4 million tonnes, which is estimated to be worth between US$476 million and US$956 million. In turn, the livelihoods and food security of millions of people would be impacted, with Cambodia expected to suffer the most. No mitigation technology currently exists which could effectively mitigate the impacts to the Mekong fisheries. Reservoir fisheries would also not be able to compensate for the loss of capture fisheries and would produce at best one-tenth of the lost capture fisheries production.

Threats to Aquatic Biodiversity: Through changes to the river's morphology, flow and aquatic habitat, the immense biodiversity of the Mekong River would be at risk. More than half of the recorded fish species in some zones would be lost. In addition, important iconic and critically endangered species, such as the Irrawaddy dolphin and the giant Mekong catfish, would likely be driven to extinction.

Terrestrial System Changes: The Mekong dams would have a major impact on terrestrial ecosystems and agriculture due to areas of inundation. Nearly half of the Lower Mekong River's land and forested areas is located in recognized Key Biodiversity Zones, as well as in National Protected Area and Ramsar sites. The dams will inundate important wetlands and river channel areas and impact terrestrial habitat for fauna and flora. Transmission lines and access roads would further alter the landscape.

Lost Riverbank Gardening: More than half of the Mekong's riverbank gardens would be inundated by the Mekong dams and damaged by daily water fluctuations.

This would result in lost income generation of between US$18 million to US$57 million, while also reducing household vegetable consumption. The households that would be hardest hit are those located in Northern Laos.

Mekong Delta Instability: The reduction of sediment flow in the Mekong River would have serious consequences on the transport of important nutrients which help to fertilize Cambodia's floodplains and Tonle Sap or Great Lake system, along with the Mekong Delta in Vietnam. These impacts in turn would affect the stability of the Mekong Delta through impacts to inland and coastal fisheries, increased saline intrusion, reduced agricultural productivity, and destabilizing the river channels and coastline of the Mekong Delta.

Livelihood, Culture and People: The livelihoods and food security of more than 40 million people who depend on the Mekong River's rich fisheries would be undermined through the construction of the Mekong Mainstream Dams. Furthermore, impacts to agricultural land, compounded with climate change impacts, could further reduce food security in the region. By changing traditional ways of living, the dams could lead to increased poverty and difficulty in meeting the Millennium Development Goals.

What is of even greater surprise is the findings of the SEA team that the economic benefits of the projects would accrue mostly to the private developers and contractors building the projects, and that the projects would have relatively little impact on power supply for Thailand and Vietnam, the two major consumers of the electricity from these projects. They would have only a minor impact on electricity prices for Thailand and Vietnam and would generate the equivalent 1 year's demand growth for the lower Mekong Basin. Taken in this context, the tradeoffs are enormous in the proposition to dam the mainstream, since the impacts would be massive, and yet the projects themselves would not contribute significantly to the region's energy security.

The SEA concludes that the mainstream dams have the potential to create international tensions within the lower Mekong Basin due to the extensive impacts from the scheme, that many of the risks from the dams cannot be mitigated at this time, that there still remain critical gaps in understanding about the river ecosystem, that there are many substantial gaps in governance in the region, and that the governments lack capacities in personnel and skills to manage the projects. These findings lead the SEA team to recommend that decisions on mainstream dams be deferred for 10 years, and that this period of time be used to examine alternative nondam options for generating electricity from the Mekong Mainstream, as well as to improve the understanding of the river basin's ecology and potential impacts of the projects in order to make a decision about whether the tradeoffs are manageable or not.

The question now facing the region's governments and the Mekong River Commission Secretariat is whether they will adopt the recommendations of the SEA. Unfortunately, the writing on the wall is not good. While the SEA final report was delivered to the Commission in August, it has yet to be released to the public. We have heard from some sources that the MRC—because it does not like its conclusions—is attempting to distance itself from the SEA recommendations and to move forward with some of the dams.

Indicative of the lukewarm response of the MRC to the report is that the latest draft of the Basin Development Plan, the main planning instrument developed by the MRC to coordinate river basin developments. The plan's latest draft makes little mention of the Strategic Environmental Assessment, and instead recommends that the six dams planned for the cascade north of Vientiane go forward. This strategy (along with the other options) is now being discussed among the four Mekong governments and an agreement should be made by the end of the year. The MRC is also pushing for the regional approval process to begin on the planned Xayaburi dam on the Mekong mainstream in northern Laos, which is the project at the most advanced stage of planning. The Xayaburi dam would displace thousands of people in Laos, disrupt an important fish migration route and cause the extinction of the critically endangered Mekong giant catfish by destroying one of their last natural spawning habitats. The MRC is pushing for the decisionmaking process on this first dam to start soon, despite the fact that the SEA report hasn't yet been released, considered by regional governments, nor incorporated into the Xayaburi EIA.

Mr. Chairman, and Senators, this must not be allowed to happen.

THE ROLE OF THE UNITED STATES

This brings me to the final part of my presentation: what can the United States do to avert disaster on the Mekong?

As a first step, the U.S. State Department, in its role as a donor to the Mekong River Commission and to the regional governments, should push for the SEA report to be publicly released and endorsed by the MRC and member countries. The U.S. should help push for wide dissemination and public consultations to take place within the region around the SEA, ensuring that the needs and views of riparian communities are considered. The U.S. should also push for the SEA's recommendations to be followed, which means deferring decisions on mainstream dams for at least 10 years until the findings and recommendations provided by the SEA are adequately considered and implemented and informed decisionmaking can be guaranteed.

The United States could contribute to this informed decisionmaking through offering the assistance of the U.S. Geological Survey in generating more comprehensive datasets on the river's hydrology, ecology, sediment flows and water quality, and ensuring that this information is released in the public domain.

The U.S. State Department should also continue to voice its concerns over the security risks these dams pose, and continue its work in highlighting the importance of regional food security and the important role fisheries plays in the region.

We understand that through the Lower Mekong Initiative, the U.S. plans to spend around $22 million in 2010 on environment programs in Cambodia, Laos, Thailand, and Vietnam. Some of this money will be allocated for the new "sister-river" partnership which was established between the Mekong River Commission and the Mississippi River Commission on May 12, 2010. This partnership aims to improve the management of transboundary water resources, learning from experiences in the Mississippi River Basin. Money will also be allocated for the initiative's work on climate change, which is looking at developing regional strategies to address the impact of climate change on water resources, food security, and livelihood. Yet beyond this, very little is known about what the State Department is planning to do with its Lower Mekong Initiative and Mississippi-Mekong River Partnerhsip. We would appreciate the Foreign Relations Committee's help in pushing the State Department to be more transparent about their engagement with the Lower Mekong countries and consult with NGOs in the U.S. and the region.

Finally, we believe that the U.S. Government could play an instrumental role in providing technical assistance and support for the development of sustainable energy options for the region. Through providing support and training for better energy planning processes such as integrated resources planning and strengthening electricity regulators, coupled with technical assistance and startup funds for investment in energy efficiency and clean renewable energy sources, the United States could play an important role in pushing for a clean energy future for the Mekong region, allowing the Mekong River Basin to be preserved to allow for the security and continuity of future generations.

Chairmen Webb, thank you again for the opportunity to contribute to this important debate.

Senator WEBB. Thank you very much, for your testimony, Ms. Imhof.

And welcome, Ms. Chungyalpa.

STATEMENT OF DEKILA CHUNGYALPA, DIRECTOR FOR THE GREATER MEKONG PROGRAM, WORLD WILDLIFE FUND, WASHINGTON, DC

Ms. CHUNGYALPA. Thank you, Chairman Webb, Ranking Member Inhofe, and members of the subcommittee, for having me testify today.

My name is Dekila Chungyalpa, and I'm the director of the Greater Mekong Program for the World Wildlife Fund.

For almost 50 years, WWF has been working to protect nature all over the world. Today, we are the largest international conservation organization, with presence in over 100 countries.

WWF has been working in the Mekong for almost three decades. The region is a treasure trove of biodiversity. Over 1,000 new species were discovered between 1997 and 2007—one decade alone. The Mekong River is the second most biodiverse river in the world, with over 1,300 species of fish. It is home to four of the top giant

freshwater species; among them, the giant Mekong catfish, known to be as long as 9 feet.

The Mekong is the world's largest inland fisheries, accounting for up to 25 percent of global freshwater catch, worth up to $7 billion annually. It provides livelihoods for at least 60 million people, and is the main source of protein for the majority of people living in this basin. This river is not simply a waterway. Its unique combination of waterflow, sediment, nutrients, fish species, and connectivity are what make it so spectacular. It is a living ecosystem, and it is still healthy and intact, compared to most of the large rivers in the world.

However, this may not be the case for long. A combination of large-scale hydropower in the Mekong mainstem, climate change impacts, especially in the delta, and watershed degradation, are all making the region much more vulnerable to environmental, economic, and, ultimately, political insecurity. The most urgent threat, as you've heard, that the Mekong River faces is that of large-scale hydropower in its lower mainstem.

As you noted, yourself, Senator, in the Upper Mekong, China has completed building the Xiaowan Dam, which has 10 times the reservoir capacity than its three existing dams—that is, 10 cubic kilometers, one—if you can just imagine it, 10 cubic kilometers—and is in the process of building an even larger reservoir. This, of course, gives China significant leverage over the Lower Mekong countries.

In the Lower Mekong, there are currently 11 dams in different planning stages of development on the mainstem, with one in Sayabouly, as my colleague just mentioned, in northern Laos, which, just yesterday, was notified to the Mekong River Commission by the Lao Government. This is the first time the process of notification will actually be enacted by the Mekong River Commission.

Almost 50 percent of the fish species in the Mekong are migratory and travel long distances to spawn. Dams on the mainstem would prevent them from doing so. One dam alone on the mainstem, such as Sayabouly, would cause the extinction of many wild populations, including the Mekong giant catfish.

The Vietnam portion of the Mekong Delta is home to 17 million people and contributes more than 50 percent of Vietnam's staple food crops. Reduction of sediment trapped by dams upstream would mean the delta's nutrients are no longer able to be replenished, threatening the very source of the country's wealth and security.

WWF is not antidam. We recognize the aspiration of greater Mekong subregion governments to follow the growth strategies that were also followed by the United States and other developed nations. We advocate for energy from sustainable hydropower plants placed on suitable tributaries of the Mekong River. In collaboration with the Asian Development Bank and the Mekong River Commission, and with support from USAID's own ECO-Asia program, we are currently developing a basinwide sustainability assessment tool that identifies tributaries that are most important, in terms of fish migration routes in the Mekong.

WWF has also identified 70 financial institutions that have invested in Mekong hydropower projects. These include five major

U.S. institutions: JPMorgan, Morgan Stanley, State Street, Dimensional Fund Advisors, and Fidelity Group. Coincidentally, tomorrow in Bangkok, WWF, along with—Oxfam, Proparco, and the World Bank, are hosting a Hydropower Financing summit. It will explore the risks of hydropower financing on the Mekong mainstem. We have 30 confirmed participants from the banking sector, including Morgan Stanley. WWF hopes the summit will initiate a basinwide dialogue on sustainable hydropower planning and placement on the Mekong mainstem.

I'd like to talk about two other related challenges. The Mekong Delta is one of the world's three most vulnerable deltas to climate change. Current projections state that the most likely outcome is a 1-meter rise in sea level by the end of this century. That would submerge one-third of the Mekong Delta. Adding dams to this equation limits the Delta from replenishing itself, just as sea-level rise begins to eat away at the coast and saline intrusion destroys productive lands.

Already we are witnessing erratic changes in flood patterns. Without significant steps to alter the course we are on, cross-border migration, breakdowns of roads and infrastructure, and the resulting humanitarian challenges, could create major security issues in the region.

The governments are fully aware of the potential for conflict caused by climate change. It is not uncommon for them to send military representatives to regional workshops on climate change.

I was in New York City yesterday to meet with the Thai Minister of the Environment, His Excellency Suwit Khunkitti. He asked us to meet with him to discuss new solutions for environmental problems in the region. He said "If we lose the forests, our water source is broken. If we lose our water, our lifecycle is broken. If our life cycle is broken, our economies and our communities are broken. If we lose our forests, we lose everything."

The foundation of the Mekong River is its watersheds. It is the forests that regulate the supply of waters to rivers, that absorb carbon, that buffer the region from climate change, and that harbor important biodiversity. Deforestation continues unabated in many parts of the region. Without a regional mandate and shared vision of sustainable development for the Mekong region, these combined challenges will undermine the well-being of the people and the development aspirations of the Mekong countries.

His Excellency has raised a new idea. He would like the region to consider a Mekong Forest Commission, an agreement among the Lower Mekong countries to protect, conserve, and use commonly identified forests and critical watersheds in a sustainable manner, and is willing to champion this idea among his peers.

Recent U.S. engagement has had a very positive impact on the Mekong region, not least of which is a renewed will to work on freshwater issues on a regional scale. A significant inspiration for this has been the two visits made by Secretary Clinton. Furthermore, the United States has demonstrated its long-term commitment to the region's stability through the State Department's Lower Mekong Initiative. The U.S. Government can continue to create long-term security in the Mekong region and call for a moratorium on the approval of mainstem dams to carry out a full

assessment of the risks from such development, including the Sayabouly Dam in Laos.

The U.S. Government should advocate the Mekong River Commission procedure that includes notification, prior consultation, and agreement, and, most importantly, monitor the procedure to ensure that a rigorous and transparent assessment is made, using all available scientific and expert analysis of the impacts of this particular dam.

The U.S. Government can support the full recognition and endorsement of the 1995 agreement of the Mekong River Commission and bolster its authority to better manage and preserve the Mekong's water resources. We ask that the U.S. Government encourage a fair and meaningful dialogue with China.

The Prime Ministers of the Lower Mekong countries have recently formally invited China and Myanmar to join the MRC. We are given to understand that Myanmar will actually accept the invitation. However, China has yet to respond. However, if the freshwater biodiversity fisheries and future of the Mekong River are to be sustained, a whole-of-basin approach must be attempted. As one of the largest global donors to multilateral development banks, the U.S. Government can demand that they take a whole-of-basin approach on hydropower, especially given their own mandate for poverty reduction and the importance of a free-flowing Mekong to millions of people.

The U.S. Government can also promote green science-based solutions. The Lower Mekong Initiative has developed a modeling system for climate change, called "Forecast Mekong." It helps the Vietnamese Government analyze adaptation to sea-level rise, and emphasizes sustainable solutions rather than stopgap measures, such as building more dikes and walls. The U.S. Government should continue to do so, but, more importantly, invest in and provide incentives for environmentally sound infrastructure development.

And finally, we ask that the U.S. Government call for a regional agreement on sustainable use and development of natural resources in the Mekong region. Harnessing the political will demonstrated by His Excellency Khun Suwit through a Mekong Forestry Commission may be just the right place to begin.

Chairman Webb, thank you once again for having me testify today.

For more details on any of these points, please refer to my written testimony.

WWF strongly urges the U.S. Government to continue to play an empowering role in the region and to support ecosystem-based approaches for a climate-resilient and free-flowing Mekong River.

Thank you.

[The prepared statement of Ms. Chungyalpa follows:]

PREPARED STATEMENT OF DEKILA CHUNGYALPA, DIRECTOR, GREATER MEKONG PROGRAM, WORLD WILDLIFE FUND, WASHINGTON, DC

INTRODUCTION

Chairman Webb, Ranking Member Inhofe, and members of the subcommittee, thank you for having me testify today on the challenges to water resources and security in Southeast Asia. My name is Dekila Chungyalpa, and I am Director of the Greater Mekong Program of the World Wildlife Fund.

For nearly 50 years, WWF has been protecting the future of nature. Today we are the largest international conservation organization in the world. Our unique way of working combines a global reach with a foundation in science, involves action at every level from local to global, and ensures the delivery of innovative solutions that meet the needs of both people and nature. We currently sponsor conservation programs in more than 100 countries, thanks to the support of 1.2 million members in the Unites States and more than 5 million members worldwide.

Using the best available scientific knowledge and advancing that knowledge where we can, WWF works to preserve the diversity and abundance of life on Earth and the health of ecological systems. We do this by protecting natural areas and wild populations of plants and animals, promoting sustainable approaches to the use of renewable natural resources, and promoting more efficient use of resources and energy while maximizing the reduction of pollution. WWF is committed to reversing the degradation of our planet's natural environment and to building a future in which human needs are met in harmony with nature.

The six countries flanking the Mekong River are often grouped together and are collectively known as the Greater Mekong Subregion[1] (GMS). WWF has been present in the GMS countries (with the exception of Myanmar) for 30 years, working closely with all levels of government, as well as communities, development agencies and the private sector. This work has included not only traditional conservation issues, but has broadened the organisation's scope of work to include sustainable development. Given the significance of hydropower development to the region's ecosystems and natural resources, WWF is also an active member of the International Hydropower Association and the Hydropower Sustainability Assessment Forum. The Forum is developing a Sustainability Assessment Protocol, a tool to measure and guide performance in the hydropower sector. Its membership includes, among others, bilateral and multilateral development agencies and the Equator Principles[2] Financial Institutions Group.

THE MEKONG AND ITS RESOURCES

WWF–US has identified the Greater Mekong Subregion as one of 19 global priority places where we have chosen to focus our conservation efforts. This vast region contains irreplaceable treasures ranging from communities with rich cultural heritages to unique wildlife in spectacular natural landscapes. The region is home to almost 100 distinct ethnic groups that are heavily dependent on the river and its natural resources for protein as well as livelihoods. It is also habitat to extraordinary biodiversity, including large mammals such as the Indochinese tiger, the Asian elephant, and the last remaining populations of the Irrawaddy dolphin.

The region is defined by the Mekong River—the longest river in Southeast Asia. It unites 320 million people as it flows over 4,000 kilometres starting in the Tibetan-Qinghai plateau, through China, Myanmar, Thailand, Laos, Cambodia, and Vietnam into the South China Sea. It also nurtures and sustains an extraordinary level of freshwater biodiversity and endemism. The Mekong River basin provides habitat for at least 1,300 species of fish, including four of the top 10 giant freshwater species of the world: Mekong giant catfish (*Pangasianodon gigas*), giant pangasius (dog-eating catfish) (*Pangasius sanitwongsei*), giant barb (*Catlocarpio siamensis*), and the giant freshwater stingray (*Himantura chaophraya*). By length, the Mekong is the world's richest waterway for freshwater biodiversity, fostering far more species per unit area than even the Amazon.

The geomorphology of the Mekong is varied; from reservoirs of frozen water in its source area, to low depths and stretches marked with rocks and boulders, to enormous rapids and deep pools toward the end. At least 170 deepwater pools can be found in Cambodia and Laos alone, with the deepest measuring 80m in depth. In the dry season, when the Mekong often recedes and fish habitats on the floodplain disappear, deep pools play a crucial role, providing refuges for many of the Greater Mekong's fish species to feed and grow in. Moreover, the river's annual floods and flow patterns carry much needed sediments to sustain the agricultural productivity downstream.

At least 150 of the river's fish species are migratory, and 50 of these are commercially important in the Mekong, particularly in the Tonle Sap, which provides up to 75 percent of Cambodia's inland fisheries. The Lower Mekong basin provides food security and livelihoods to over 60 million people, and fish is the main source of pro-

[1] The GMS comprises Cambodia, Laos, Myanmar, Thailand, Vietnam, and Yunnan province in China.

[2] The Equator Principles refer to a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing.

tein for these inhabitants, ranging from 42–51 kg per person per year[3]. It is estimated that approximately 2.8 million tons of fish and other aquatic animals are consumed each year, and an estimated 1.1 million tonnes of aquaculture products are exported, making the Mekong the largest inland fishery in the world. Mekong fisheries yield 3.9 million tonnes per year, accounting for 19–25 percent of inland catches worldwide and worth between $3.9 billion and $7.0 billion.[4] The fisheries are heavily dependent on wild capture: aquaculture accounts for only 10–12 percent of production and it, too, depends on wild fish for feed. Preserving natural variations in river hydrology is important for sustaining high fish diversity; natural flood pulses are often what trigger fish to migrate to spawning habitats, migrating between distant habitats.

A REGION ON THE MOVE

Of the six countries that comprise the GMS, three of these—China, Vietnam, and Thailand—are rapidly growing economies, while Cambodia, Laos, and Myanmar lag far behind in relative economic terms. The GMS is one of the fastest growing regions in the world, and the demand for energy, particularly in China, Thailand, and Vietnam is expanding. Rapid industrialization is pushing the development of hydropower in the Mekong Basin, including the proposed main-stem dams. In addition to fueling the fastest growing countries, hydropower development is seen as an avenue for poverty alleviation for Cambodia, Laos and Myanmar. The challenge facing the GMS governments is clear: they must sustain economic growth while simultaneously ensuring that the Mekong and its ecosystems remain healthy.

The GMS initially was designed as a trade agreement facilitated by the Asian Development Bank, in order to strengthen connectivity and cross-border trade, and to integrate national markets. As such, it is really a grid of transport networks, often referred to as "economic corridors."

The GMS Strategic Plan as it was originally conceived consists of 305 planned projects worth $31 billion, broken down as follows:

- Roads and bridges—$7.6 billion
- Railways—$13.2 billion
- Ports and navigation—$2.6 billion
- Airports—$84 million
- Electricity grid—$338 million
- Gas pipelines—$1.3 billion
- Power stations—$4.8 billion
- Telecommunications—$29 million
- Tourism—$446 million
- Livelihood projects—$44 million
- Industrial estates—$1.0 billion

While not directly mentioning hydropower, GMS clearly prioritizes development of a regional electricity grid and infrastructure that will move this forward. Given that the GMS is one of the fastest growing regions in the world, there is a correlating increase in the demand for energy. This demand for energy should be met with clean energy that does not aggravate climate change nor threaten the unique ecosystems and livelihoods of the GMS. Potential alternatives to mainstream dams should be explored, including carefully considered tributary dams, or other forms of renewable energy such as wind power or solar power.

Currently, in the Upper Mekong, China has just completed building the Xiawan dam, which has a larger reservoir capacity (10 km^3) 10 times more than its three existing dams—Manwan, Dashwan, and Jinghong, (which add up to less than 1 km^3) and is in the process of building an even larger reservoir (12 km^3). This gives China significant leverage over the Lower Mekong countries. For example, China will be able to increase the mean monthly flow to Laos by 20 percent in March, the driest month of the year. However, these reservoirs are being built to produce cheap and reliable electricity for the Chinese market, and not to help agriculture, navigation or floods in the lower Mekong.

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[3] Mekong River Commission. 2010 "State of the Basin Report: 2010." Mekong River Commission, Vientiane, Lao PDR.

[4] Mekong River Commission. 2010 "State of the Basin Report: 2010." Mekong River Commission, Vientiane, Lao PDR.

GROWING THREATS TO THE MEKONG

Hydropower

While hydropower development has potential economic and greenhouse gas reduction benefits, it also brings about enormous costs. Hydropower dams fundamentally alter the river ecosystem, often with negative impacts to livelihoods and biodiversity. Each subsequent hydropower dam further diminishes the river's ability to naturally adapt to ecosystem impacts. The clock is ticking; there are currently 11 dams in different planning stages of development on the Lower Mekong main stem, with one in Sayabouly, northern Laos, on the verge of being notified to the MRC Joint Committee by the Government of Laos. Hydropower threatens to impact the Mekong and its ecosystems in three main ways:

(i) *Delta stability:* The Vietnam portion of the Mekong delta is home to 17 million people, contributes more than 50 percent of Vietnam's staple food crops and is the source for 60 percent of fish production in Vietnam. This region provides food for 40 million people and contributes 27 percent of Vietnam's GDP. Given that more than 22 percent of Vietnam's population is located in the Mekong Delta, the spillover effects of hydropower development will be even larger. Reduction of sediment trapped by dams would mean that the delta's nutrients are no longer being replenished, threatening the very source of the country's wealth and security. Furthermore, this would increase the vulnerability of the delta, limiting its ability to replenish itself and making it more susceptible to sea-level rise and saline intrusion.

(ii) *Fish diversity:* In September 2008, a team of fish migration experts organized by the Mekong River Commission concluded that there is no evidence that fish passage facilities currently used on dams in other large tropical rivers can cope with the massive fish migrations and high species biodiversity found in the Mekong. The technologies used on high dams in North America and Europe were developed for a very limited number of species (5 to 8). In contrast, there are 150 migrant fish species in the Mekong, and biomasses are 100 times greater.

(iii) *Livelihoods:* There are at least 50 commercially important migratory fish species in the Mekong River, representing 70 percent of the total catch. Over 75 percent of rural households in the Lower Mekong Basin are involved in fisheries, both for their own consumption and for sale. Any impact on the ecological balance of the river also threatens the sustainability of these aquatic resources that millions of people depend on. Dams in the main stem would impede migration of fish and other aquatic animals, potentially reducing productivity of the fishery by as much as 60 percent and compromising the livelihoods of millions of people.

Climate Change

The Intergovernmental Panel on Climate Change has identified the Mekong Delta as one of the three most vulnerable deltas on the planet to climate change impacts. These impacts include sea-level rise, saline intrusion and more severe storms, which erode the coastline and undermine coastal ecosystems. Main-stem dams will block the sediment that builds the delta and with it the nutrients that feed the delta's immense. As sediment is trapped by dams, the reduction in the amount reaching the river mouth will decrease the capacity of the delta to replenish itself, making it even more vulnerable to sea-level rise, saline intrusion and erosion. With nearly a quarter of Vietnam's population located in the Mekong Delta, the combined impacts of the proposed main-stem dams and climate change will pose significant social and economic challenges to that country in coming years.

The Mekong River is first and foremost an ecosystem. Anything done to impede its natural flow will also prevent it and the surrounding basin from adapting naturally to expected climate change impacts, including changes to average temperatures, water availability from precipitation and runoff, and sea level. Changes in temperature can affect rates of growth and reproduction for individual species and can also change species distribution and ecosystem processes such as nutrient cycling. WWF holds that climate change impacts will accelerate the extinction of some species given the high rate of endemism and habitat fragmentation found in the Mekong basin.

Changes in the seasonal flow pattern in the Mekong River basin will strongly influence future species composition and ecosystem productivity. Changes in temperature and precipitation in the basin may also affect the very nature of the region's wetlands—vital aquatic systems that are used for rice cultivation and freshwater fisheries and help to mitigate floods and erosion. Sea-level rise will have significant negative impacts in the Mekong Delta region because of the delta's high population density, which is supported by productive wetlands and estuaries that are in turn maintained by naturally fluctuating water levels and input of fresh water from the river. These upstream inputs of freshwater deliver much-needed nutrients and sedi-

ments, which are critical for wetland soils to accumulate and prevent plants from being inundated.[5] Sea-level rise and saltwater intrusion threaten to upset this natural balance and undermine the Delta ecosystem.

The anticipated human consequences of unmitigated climate change on the Mekong are hard to imagine. Projections across the Mekong basin show an array of climate change effects, including a potential sea-level rise of a meter by the end of the century. If unaddressed, a 1-meter rise in sea level could submerge more than a third of the Mekong delta, home for 17 million people and source of nearly half of Viet Nam's rice.[6] Already, we are witnessing erratic changes in flood patterns in the Mekong Delta. Combined with sea-level rise, we can anticipate further breakdowns of roads and other infrastructure, leading to the increasing likelihood of economic and social instability. Even the more modest predictions of how the region and its communities, ecosystems and economies may be altered suggest that, without significant steps to reverse course, the humanitarian impacts of accelerating climate change in the Mekong are likely to present new security challenges for both GMS countries and the international community in the 21st century.

GEOPOLITICS IN THE GMS

The Mekong countries are often seen as a cohesive bloc, largely due to the Greater Mekong Subregion (GMS). In realpolitik terms however, the GMS consists of nations that are very diverse culturally and that navigate strong bilateral tensions, as in the case of Thailand and Cambodia. The droughts experienced in 2010, and the subsequent assertions by Thailand that these may have been caused by dams on the Upper Mekong, have made it clear that lower Mekong countries are waking up to the decisions made by their Chinese neighbours to the north and are increasingly willing to take them to task. At the same time, Thailand and Vietnam have not acknowledged their own power development plans, which substantially rely on centralized hydropower development. In the context of this kind of political gridlock, it is not surprising that while the GMS has a designated Working Group on the Environment, it has so far not been successful in mainstreaming regional-level environmental planning and design into GMS's core business of economic growth and trade.

Other regional forums exist, such as the Mekong River Commission, but it is handicapped by the fact that despite being an intergovernmental body created to promote sustainable management of the Mekong River, it is effectively limited to decisions made by the four lower Mekong governments through the Joint Committee and Council. China is so far only a dialogue partner and Myanmar is not included, thus leaving no constructive platform for dialogue on regionwide water use and management issues.

In the past year, Vietnam and Cambodia have grown increasingly aware of the disproportionate burden that they will face as downstream nations if any of the Lower Mekong dams go forward. Not coincidentally, both countries share a history marked with famine, mass migration, and food insecurity. Add in the potential for political conflicts due to climate change impact scenarios in the regions, and it becomes clear why lower military departments from the lower Mekong governments have been known to attend WWF meetings and consult with us on water resource management and climate change.

RECOMMENDATIONS: A SUSTAINABLE COURSE FOR THE MEKONG BASIN

The decision to construct a dam on the main stem of the Mekong River will have permanent consequences and should be very carefully considered. In 1995, the four Lower Mekong countries signed an agreement that committed them to the sustainable development of the Mekong River. The proposed mainstream dams challenge this commitment. Prior to hydropower development, a comprehensive assessment of the full economic, social, and environmental costs and benefits in the Mekong Basin should be conducted. Approval of any of the main stem dams should be delayed until completion of this study. In addition, WWF offers the following specific recommendations for a way forward:

(1) A 10-year delay in the approval of the mainstream dams would allow for a comprehensive cost-benefit analysis of their construction and operation.

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[5] Mekong River Commission. 2010 "State of the Basin Report: 2010." Mekong River Commission, Vientiane, Lao PDR.

[6] Institute of Strategy and Policy on Natural Resources and Environment (Viet Nam) 2009 "Vietnam Assessment Report on Climate Change (VARCC)."

(2) The 1995 agreement of the Mekong River Commission should be fully recognized and endorsed, in particular the procedures for notification, prior consultation and agreement.

(3) In collaboration with the Asian Development Bank (ADB) and the Mekong River Commission (MRC), WWF is testing Environmental Considerations for Sustainable Hydropower Development (ECSHD) in Sesan, Sekong, and Srepok tributary rivers in Cambodia. The project objective is to build a set of interventions into existing planning processes that will help move the Mekong countries towards adopting an agreed framework for sustainable hydropower development. The most recent advancement includes a river-basin-wide sustainability tool (R–SAT) developed in collaboration between ADB, MRC, WWF and support from USAID via EcoAsia. Merely developing the tool however does not mean it will be implemented. Therefore, promoting and financing similar approaches and the application of such tools is crucial.

(4) One alternative to mainstream dams is tributary dams. These need to be considered as more feasible alternatives based on careful selection criteria and methodology. To ensure the overall ecological integrity of the Mekong Basin, some tributaries will need to remain free flowing to preserve the values of connectivity of the river from headwaters to the sea and to allow for migrant fish to continue to breed and support the livelihoods of local communities. WWF's Greater Mekong Program is using GIS-based tools to select free-flowing tributary candidates, and we promote the concept of free-flowing rivers to decision makers in these specific sub-basins.

ALTERNATIVE SOLUTIONS PROMOTED BY WWF

WWF offers the following general recommendations for sustainable development in the GMS:

Take an ecosystem-based approach

Confronting climate change is one of the greatest challenges of our time. How do we address such an overwhelming issue and where do we start? There has been much analysis and discussion, but few practical solutions are being proposed at the local level to help communities, the private sector, policymakers and planners to provide ecosystems the opportunity to adapt to a changing climate.

A resilient ecosystem has the ability to withstand threats and systemic shocks and can renew and restore itself even if degraded. The best example is that of mangrove forests and coastal wetlands in India, which were able to absorb the floodwaters during the 2004 Asian tsunami. Unfortunately, restoration and preservation of coastal wetlands is one of the few established and well-known adaptation strategies. In the case of freshwater ecosystems, there is an urgent need to understand how to build both ecosystem and social resiliency and to identify adaptation strategies at a site level.

WWF is learning in our various project sites that ecosystems will not react in a gradual manner to climate change impacts but will instead react rapidly and at multiple scales. To complicate this further, the speed at which these impacts are taking place is outstripping most public sector thinking, which consists of reflexive and short-sighted reactions, such as the call for sea walls and other inappropriate structural investments that are already appearing in the Mekong Delta. The challenge therefore lies in convincing existing national and regional institutions to adopt environmental and social resilience-building strategies across all economic sectors and political boundaries.

Engage the Finance Sector

In 2009, WWF Greater Mekong Programme commissioned a report to investigate sources of funding that would allow the proposed dams to be constructed on the main stem. This study identified 12 project companies set to construct dams on the lower Mekong main stem and 70 financial institutions that invested in the different stages of the feasibility study of these projects. For practical purposes, this list of financial institutions was then narrowed down to 28 banks:

Financial institution	Country of origin	CSR policy	Equator principles adopted	Signatory to UNEPFI and/or PRI	Specific policy on dams
Agricultural Bank of China	China	No	No	No	No
Bank of Ayudhya	Thailand	No	No	No	No
Bank of China	China	Yes	No	No	No
Bank of Communications	China	Yes	No	No	No
Barclays	United Kingdom	Yes	Yes	Yes	No
China Galaxy Securities	China	No	No	No	No
CIMB Bank	Malaysia	No	No	No	No

Financial institution	Country of origin	CSR policy	Equator principles adopted	Signatory to UNEPFI and/or PRI	Specific policy on dams
Guotai Junan Securities	China	No	No	No	No
HSBC	United Kingdom	Yes	Yes	Yes	Yes
Industrial & Commercial Bank of China	China	Yes	No	No	No
JPMorgan	United States	Yes	Yes	Yes	No
Morgan Stanley	United States	Yes	Yes	No	No
State Street	United States	Yes	No	Yes	No
Dimensional Fund Advisors	United States	No	No	No	No
Bank of Tokyo-Mitsubishi UFJ	Japan	Yes	Yes	Yes	No
Sumitomo Mitsui Banking	Japan	Yes	Yes	Yes	No
Calyon (part of Credit Agricole)	France	Yes	Yes	No	No
KBC Bank	Belgium	Yes	Yes	No	No
OCBC Bank	Singapore	Yes	No	No	No
UBS	Switzerland	Yes	Yes	Yes	No
Standard Chartered	United Kingdom	Yes	Yes	Yes	Yes
ANZ	Australia-New Zealand	Yes	Yes	Yes	No
ADB					
EXIM	China	Yes	No	No	No
CRBC	China	Not Known	No	No	Not Known
AmBank	Malaysia	Not Known	No	No	No
Fidelity Group	United States	Yes	No	No	No
RHB Bank	Malaysia	Not Known	No	No	No

WWF is currently hosting a Sustainable Hydropower Financing Conference, taking place on the 23rd and 24th of September 2010 in Bangkok, in order to facilitate open discussion of sustainable investment practices on the Mekong main stem. We have 30 confirmed participants from the banking sector involved in funding, insuring, or supporting the Mekong main stem dams, including Morgan Stanley.

The conference has three objectives:

1. To convince banks to finance sustainable hydropower projects in the Mekong. The summit incorporates a long-term approach by providing a solution—Sustainability Assessment Protocol, and the Environmental Considerations in Sustainable Hydropower Development—that financial institutions can use only to finance sustainable projects that are beneficial to the economy and people with minimal impacts on the environment.

2. To build partnerships with key institutions in the financing sector, an essential and integral part of any investment project. WWF offers the summit as a solution-oriented event instead of what has usually been a charged dialogue between banks and NGOs. WWF hopes that financing institutions will continue to work with WWF in other infrastructure or investment project. There is an opportunity to create synergies between WWF and the financial institutions with respect to expertise, strength, and experience with sustainable development.

3. To identify a bank to lead the charge in sustainable investing in the region. Often tokened as a "lead arranger," such an institution could help WWF to reach its peers, and provide a good example of the benefits of sustainable investments. While some banks invited to the summit have had long histories of commitment to environmentally responsible financing, there are others who have not traditionally stood up for these types of issues. The summit is an opportunity to promote this practice and help those institutions interested in leading investment in sustainable hydropower development to become the champions.

Engage the Private Sector

WWF is working across the Mekong region with key industry water users, led by the Coca Cola Company, to help develop a task force to explore water stewardship issues and the role of the private sector in wise water use, particular given the impacts of climate change in the delta where many of these industries are based. This will consist of a multi-sector network that can jointly share the latest science and information, apply appropriate adaptation strategies within their markets, and invest in sustainable resilience building for local communities, businesses and ecosystems In addition this group will also explore innovative financial mechanisms for adaptation and water conservation to safeguard future water supply for biodiversity and livelihoods.

Engage the Public Sector

There is an urgent need for an integrated regional approach to natural resource management at policy and operational levels. The ongoing GEF 5 reforms offer an opportunity and could provide the resources required to make this happen. The countries of the region are willing take the bold step to commit a percentage of their GEF national allocations to a regional ecosystem based adaptation approach. We hope that such a strong regional signal demonstrates the lower Mekong governments' commitment to maintain the region's resilience for the benefit of its people, economies and biodiversity. Program components would include:

- Regionally integrated spatial planning that incorporates biodiversity conservation and climate change, applied for the sustainable management of priority landscapes in the GMS;
- Maintenance and restoration of critical ecosystems and the services they provide in selected test sites in priority landscapes by;
- Incentives to effectively manage biodiversity and carbon values to strengthen adaptation capacity in priority landscapes developed and tested;
- National and regional capacities improved for cooperation and coordination for ecosystems management and sustainable development;
- A discussion at the administrative level of the lower Mekong governments on sustainable hydropower and the need for a free flowing Mekong main stem.

AN IDEAL ROLE FOR THE U.S. GOVERNMENT

The last 2 years have shown tremendous changes in the GMS, not least of which is a renewed will to work on a regional scale. A significant inspiration for this has been the two visits made by Secretary Clinton to the region. Furthermore, the U.S. Administration has substantiated its long-term commitment to the region's stability through The Lower Mekong Initiative; a partnership between the U.S. State Department and the governments of Cambodia, Laos, Thailand, and Vietnam to enhance cooperation on environment, health, education, and infrastructure development. In particular, two science-based approaches that are beneficial are:

—The sister river partnership between the Mekong River Commission and the Mississippi River Commission allows the sharing of expertise and best practices in areas such as climate change adaptation; flood and drought management; hydropower and impact assessment, water demand and food security; and water resource management.

—The establishment of the Delta Research and Global Observation Network (DRAGON), and a new interactive, modeling system called Forecast Mekong.

This initiative creates the possibility of a strengthened lower Mekong bloc that is invested in regional win-win strategies rather than short term national interests that are unsustainable in the long run. Advancing similar relationships, as the United States has done with Vietnam, in the other lower Mekong countries will help make this a reality.

Other ways that the U.S. Government could continue to strengthen these governments and to create long-term security in the Mekong region include:

- *Call for regional cooperation on data gathering, analysis, and sharing:* Hydropower is a regional issue. Regional measures must be put in place to ensure that the ecological products and services upon which the development of this region depends are not degraded or irreversibly lost, which requires a regional approach to cost-benefit analyses. There are still large gaps in knowledge in the region. For example, what is the value of environmental flows and ecosystem services provided by the Mekong River in monetary terms? Encouraging this kind of data analysis and sharing among all the six countries is crucial. This would also invite a stronger influence from academic institutions and civil society on policy and decision making processes.
- *Promote green science-based solutions:* The U.S. State Department led Lower Mekong Initiative has developed a new interactive modeling system for climate change impacts called Forecast Mekong. It will help the Vietnamese Government better understand and adapt to sea-level rise, emphasizing sustainable solutions rather than stop-gap measures such as building more dykes and walls. By promoting these types of science-based approaches, the US Government can further the development of green technological solutions in the Mekong region.
- *Support strengthened governance and accountability with the Mekong River Commission:* The U.S. Government can support the full recognition and endorsement of the 1995 agreement of the Mekong River Commission; in particular the procedures for notification, prior consultation and agreement for hydropower dam development. More specifically, a moratorium on the approval of

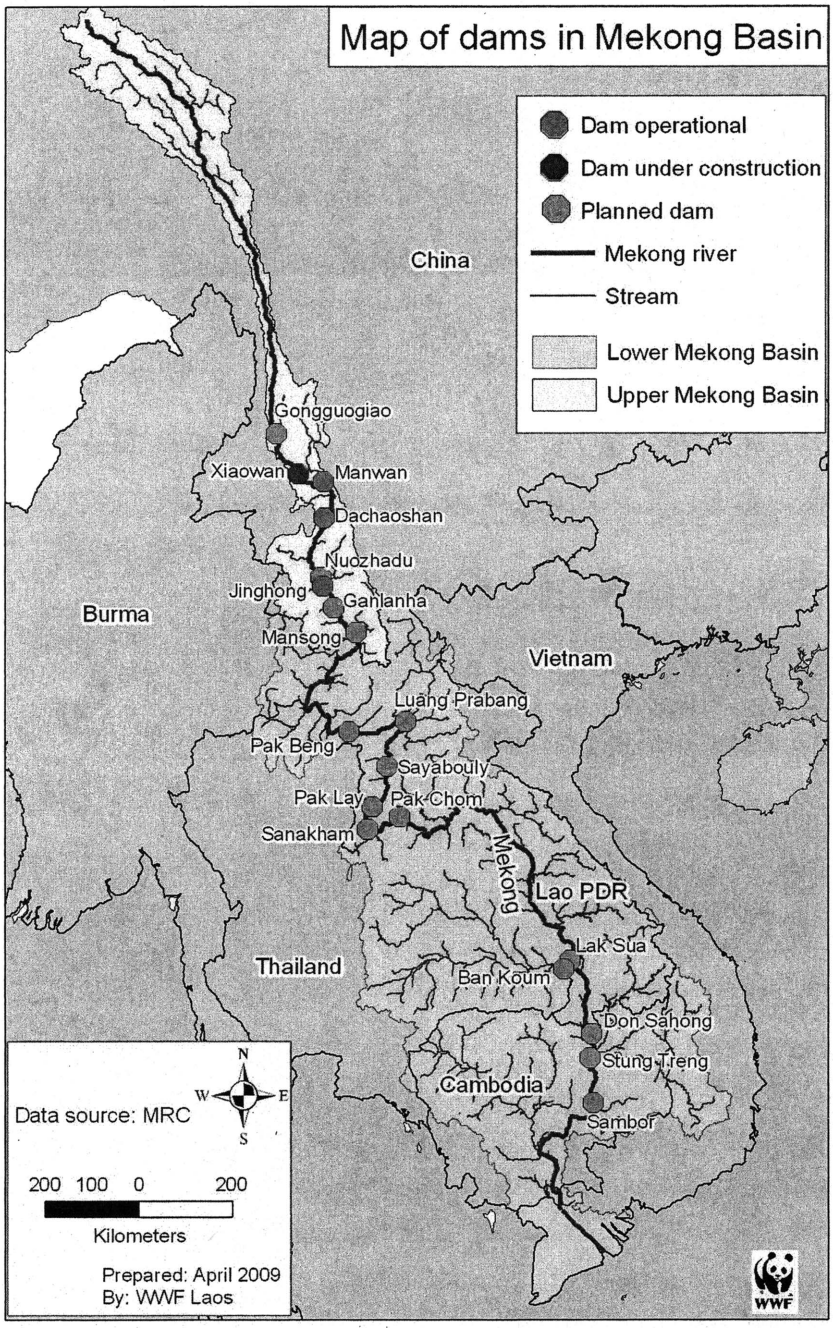
mainstream dams should be established to allow the full assessment of the risks from this development.

- *Encourage a meaningful dialogue with China:* Recently, the four Prime Ministers of the Lower Mekong countries took part in the Mekong River Commission Summit to celebrate its 15th anniversary, giving the MRC a much higher profile than in the past. China was formally asked to join the MRC by the Cambodia government. It remains to be seen if they will. However, if the freshwater biodiversity, fisheries, and future of the Mekong River are to be sustained, a whole-of-basin and even-handed approach on hydropower must be attempted.
- *Call on multilateral development banks to take a whole-of-basin approach on hydropower:* While the multilateral banks wield less influence than they did in the past, they are still very important to less powerful governments in the region. It behooves them to take cumulative impacts of hydropower development into consideration, particularly for the Mekong River basin, where poverty reduction strategies must begin with the well-being of the river. A critical place to start is with the mainstreaming of sustainable development planning in all subdivisions and in particular, the promotion of alternative green energy over that of main-stem hydropower development.

  As one of the largest global donors to multilateral development banks, the U.S. Government can call on them to mainstream what their "environmental arms" develop and recommend. Often times, conflicting mandates within different subdivisions of the same institution are the bottlenecks to implementing innovative environmental solutions and integrating a whole-of-basin approach to development.
- *Call for a regional agreement on climate change resiliency:* Climate change will profoundly affect the Mekong River's biodiversity, water resources, and economy, all of which in turn will impact its people. National governments can only respond to climate change at a local level. Given that the impacts of climate change will be transboundary and has significant implications for security, a regionally coordinated response to climate change will be most effective. Guiding a regional climate adaptation agreement that builds resiliency for ecosystems, natural resources, biodiversity and most importantly, local communities, would bring a more peaceful and sustainable future for the Mekong region. One possible opportunity is the current Global Environment Facility (known as GEF V), which allows for a transboundary approach on protecting the Mekong region's most unique ability to provide for its people; the environmental services provided by the Mekong River and its watersheds.

CONCLUSION

Chairman Webb, thank you once more for the opportunity to offer my comments on the importance of recognizing the Mekong River as one ecosystem. Taking this whole-of-basin approach emphasizes the critical need to protect the Mekong River's ecological functions, of which the free-flowing nature of its main stem is most important, for a peaceful sustainable future of the Mekong region. WWF strongly urges the U.S. Government to continue to play an empowering role in the region and to support ecosystem based approaches for improving climate change resilience for the entire Mekong River basin.


Map of dams in Mekong Basin
Dam operational
Dam under construction
Planned dam
Mekong river
Stream
Lower Mekong Basin
Upper Mekong Basin
China
Gongguogiao
Xiaowan
Manwan
Dachaoshan
Nuozhadu
Jinghong
Ganlanha
Mansong
Burma
Vietnam
Luang Prabang
Pak Beng
Sayabouly
Pak Lay
Pak Chom
Sanakham
Mekong
Lao PDR
Lak Sua
Thailand
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Don Sahong
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Kilometers
Prepared: April 2009
By: WWF Laos
WWF

Senator WEBB. Well, thank you.

And thank all of you for your testimony today, both written and oral, and that will be considered by our staff in great detail after this hearing is over. We appreciate the time that you've taken to come here and be with us today.

The first thing I would just say, after listening to you, is that it is profoundly disturbing in its implications that—on a lot of different levels—environmentally, politically, culturally, strategically—in terms of this region, that we are not paying enough attention to this issue.

And actually, Ms. Chungyalpa, when I was listening to you, one of the thoughts that went through my mind when you were talking about the enthusiasm on the climate change issue is, it's easy to get people to talk about climate change in the region, because there's no sovereignty dispute. You don't have to think about encroachment by another country, or the sorts of issues that are involved when we have to address the hydropower situation. The immediate reality of what could be happening with these—the construction of these dams, however, is extremely dangerous to the continuity of the region as it's existed for thousands of years. And it takes a little bit more of a push to get people in the region to discuss this issue.

I know when I was in Vietnam in July, I found a real hesitation among even government officials to discuss this part of the problem, because it does go into the need for governments and the business sector to truly engage in coming up with some sort of a potential structure in which to address the problem.

And it's one of our real challenges. One of the reasons I wanted to hold this hearing was to look at how do we help create an awareness of the immediacy, in terms of the seriousness of this problem? Quite frankly, the responsibility of the players, government, and business alike, who are more shortsighted and need to be addressing this is a way they perhaps don't want to.

Let me start with this. And I'd like to hear all three of your thoughts. We have been working on this amendment, which we shared with you, that would go to ADB funding and, at the same time, as all of you have mentioned, in one form or another, there are other formulas that are taking place right now in order to finance these projects. There were several mentions of that. And China, particularly, is starting to finance its own construction. We saw, just a couple of days ago, China offered a $4.2-billion interest-free loan to Burma for mass hydropower projects: road construction, infrastructure, et cetera. So, how much good can we do with this amendment? How much can we affect the process? And what are your thoughts for, perhaps, other ways that we could go about it?

And, Dr. Cronin, if you would?

Dr. CRONIN. Thank you, Senator.

Well, I think the first thing is to raise the issue. And frankly, it won't be well—your amendment won't be that well received in Manila, at least by a lot of people in the Bank. But, it's essential to get a dialogue started on this. And there is an immediacy that needs to be addressed.

One of the issues that concerns me is that if we—if the countries go ahead with these dams, you're talking about a 10- or 15-, even 20-year period when the river will be disturbed as the dams are built. And there is no one, you know, organizing or coordinating, or even strategizing, that I can see, about how to deal with the gap between when livelihoods are destroyed and food supplies are destroyed and when the benefits of electricity start to kick in. And so, that's an issue.

And I mentioned—with regard to the ADB, I mentioned that there is a slippery slope of them getting involved in sort of being the little guy behind the elephants in the parade with a scooper—pooper-scooper—to clean up, if you will, after the damage is being done. And so, I would like to see us particularly weigh in on that issue and make sure—you know, that the dam—the Bank not go down that path.

But, how to change the minds of the countries, and how to actually influence the Bank, is difficult. And in addition, as you just mentioned, the Banks are no longer central to this. I mean, this is all so-called "public/private" financing. Essentially, they're all commercial opportunities. And there's plenty of money around, apparently, to carry these projects out.

But—so, the urgent issue remains, I think, to find ways to help the governments understand the consequences of what they're starting—what they're trying to—planning to do. And I think the ADB has a role—has an important role in that.

Senator WEBB. Thank you.

Dr. CRONIN. Thank you.

Senator WEBB. Ms. Imhof.

Ms. IMHOF. Thank you. Very good questions, of course, that you're raising.

You know, China is now actually the world's largest dam-builder and funder. We have been collecting data on how many projects it's funding and building globally. And I've actually lost count, but it's probably—at the last count, I believe it was over 140 dam projects, around the world, that China was involved in. So, it is a very significant challenge.

I think—with the amendment that you've proposed, I think it's a very good amendment, in very strong language, and I think it's very important, because the ADB has been kind of the main supporter of hydropower development in the region until recently. And one thing that we are concerned about is, with a lot of the focus on the Mekong mainstream dams, that there will be a greater push for dam projects on tributaries of the Mekong. And we even, here at WWF, you know, advocating for some tributary development. And our experience with tributary projects, as I mentioned before, that they are also extremely damaging and should definitely be assessed on a case-by-case basis.

So, I think that the amendment is an important signal. I would recommend that it apply to the World Bank and the Asian Development Bank.

And the other thing that's important about it is, it refers to transmission infrastructure. And actually, the ADB is proposing to finance a transmission line in southern Laos that would enable a whole slew of tributary projects in southern Laos to go forward

that currently aren't going forward because they don't have transmission infrastructure. So, I think it's an important signal that the U.S. Government is concerned about the transmission infrastructure that allows these projects to go forward.

I think it would be really important for yourself and the committee to also push Treasury to actually implement the—sorry—to actually pressure the ADB and World Bank to implement and adopt the kind of policy reforms that you refer to in the amendment—so, things like implementation of the World Commission on Dam Standards—because what we do know from experience—I mean, as you know, Treasury hates these sorts of mandated votes, because they say that it reduces their authority. I think that where it can be important is if Congress is really pushing Treasury to push for meaningful reform—policy reform at the institution, along the lines of what is in the U.S. legislation. So, I would really encourage you to press for that.

In terms of what can be done about China, I think there has to be ongoing dialogue about Chinese financing overseas and China Export-Import Bank. I don't know if the U.S. Ex-Im Bank could play some kind of role in encouraging the China Eximbank to sign up to the common approaches adopted by the OECD on environmental and social impact assessment, lending in their operations. That might be one other role that the United States could play in encouraging China Exim to adopt international standards in its operations, and the same for Thai EXIM Bank, as well. And Thai EXIM, until now, has been very much neglected and kind of out of the loop, in terms of, you know, the international export credit agency community and looking at its standards of the projects it's financing.

Senator WEBB. Great insights. Thank you.

Ms. Chungyalpa.

Ms. CHUNGYALPA. Chairman, first, I'd like to respond by talking about climate change in the context of hydropower. Hydropower is often used as an example what green energy means. And we're really concerned, especially because it is posited in the Mekong as a solution rather than a big threat, in the context of climate change. So, climate change cannot be kept out of that dialogue, precisely for that reason.

The other thing that we're very aware of is that climate change, in some sense, gives us an opportunity to talk about issues that most governments are unwilling to talk about publicly, and that includes hydropower. It actually allows us to indirectly bring up hydropower in—at very high levels, to make the point that if you actually dam the river, you are going to be basically creating maladaptation on the river, in the long term.

Finally, as the U.S. Government has invested in the long term in sustainable development for this region, and if we are to save the river from hydropower, but then lose it to climate change, it is going to be a wasted investment. And I think that might be the broader context for climate change, and WWF's position on it.

In terms of the ADB in particular, we applaud the language on the Asian Development Bank that was shared with us. The reality of the situation is, it's always about the economy. And in the case of the ADB, it's the economic arms that always win the battle over

the environmental arms. What we have learned, sometimes in difficult situations, is that the Asian Development Bank might have arms that are willing to work on environmental sustainable solutions, might actually develop very innovative technological solutions, but, at the end of the day, they are going to be ignored by the other subdivisions of the Asian Development Bank. And maybe the most important role that the U.S. Government can play is to actually ask for mainstreaming of environmental sustainability, not just so it's side language in the Asian Development Bank's mandate, but actually mainstreamed within the mandate, especially when you consider that the mandate is about poverty reduction, not just in terms of large economic wins, but also at a household level.

Senator WEBB. Thank you.

Ms. Imhof, you stated, in your testimony, that studies have shown that the planned dams would not contribute greatly to the region's energy security; they would have little impact on regional energy prices, and only generate the equivalent of 1 year's demand for growth. What other energy alternatives would you suggest?

Ms. IMHOF. Thank you. I mean, the first thing is to look at the potential for expanding investment in energy efficiency, because there's huge potential. I mean, Thailand already has an energy efficiency program, but there is still huge potential for energy savings. And California is a great model of an entity. The State of California has managed to keep its power demand growth stagnant over the past 30 years, because of investments in energy efficiency. And the same goes for Vietnam, which doesn't have a strong energy efficiency program right now. And this is an area where I think there could be very good technology transfer between the United States and the regional countries.

One of the other issues is that Thailand—energy analysts have shown that Thailand—the Electricity Generating Authority of Thailand, the main electric utility, has consistently overestimated power demand, so there is consistently a surplus of power in the Thai system. And this has been documented over, I believe, 10 or 15 years. So, there's an issue of where EGAT consistently says, "We need more power. We need more power." And we sign—EGAT signs these agreements and then ends up—you know, the demand growth doesn't meet it. There's also been studies showing that there's significant potential for repowering of existing plants, so generating more electricity from existing plants. There's biomass potential from rice husks. And then there's, you know, renewable technologies. There's not a lot of wind potential in Thailand, but there's certainly solar potential, as well. So, there is definitely potential there.

The biggest issue is really the kind of political and economic interests that are driving these sorts of projects. And there's very strong—for example, the developer of the Xayaburi Dam project, a Thai company called CH. Karnchang, has very strong political interconnections with the Thai Government and is a very large Thai construction company. So, there's more political interests that are driving—and economic interests—that are driving the development of these projects, rather than actually the demand for power.

I mean, there's still no study out there that actually says that this power is necessary to meet the region's energy needs.

Senator WEBB. Thank you.

Dr. Cronin, in your written statement, you mentioned that China is already considering the diversion of some Mekong water to the Yangtze River to replenish water sent north——

Dr. CRONIN. Yes, sir.

Senator WEBB [continuing]. As part of the south-to-north diversion project. Where are they on this? And do we see that this is a serious plan? Because it certainly does go into what you would call water sovereignty——

Dr. CRONIN. Right.

Senator WEBB [continuing]. If they're taking water that historically would be going downstream, and diverting it to another place inside their own country.

Dr. CRONIN. Yes. Well, thank you. As in all things regarding Chinese decisionmaking on these kinds of sensitive political—geopolitical issues, they don't show their hand. These are rumors—and there's substance to them—that they are considering these projects. How far along they are is a big question. But, I think, in the longer term, the stark reality is that China does not have enough water. And, of course, China's going to try to transport—they're building canals to transport water over 1,700 kilometers, from the Yangtze River to the Yellow River, which is now running dry at the mouth during unusually dry seasons. And there's no way that China can keep growing the way it's growing and using water the way it's using it without resorting, ultimately, to some kind of water sovereignty—"water nationalism" I would call it.

So, the Indians are also very worried about projects—the plans that China has at least discussed or as—there is information about plans that China wants to dam the upper reaches of the Brahmaputra River in—I think it's in Tibet, actually. And the same kind of story, that if they bleed water away from the Brahmaputra River for their own use, then you've got the whole Bay of Bengal issue, for both India and Bangladesh.

Senator WEBB. The question occurred to me—Is there an international forum in which downstream riparian water rights could be considered with sort of decisional authority?

Dr. CRONIN. Unfortunately, no. And one of the problems with water rights is that, traditionally, countries that agree to negotiate over water rights and to—and countries that respect upstream/downstream rights, are talking about dividing shares of water: How much do you get, how much do we get? A good example is the Indus River Agreement between India and Pakistan. Essentially, they took five rivers and said to Pakistan, "You get two, and India, you get three." And that's been a rather lasting agreement.

But, the key issue with the Mekong is what we call the "flood pulse." That is the flood pulse is necessary for the aquatic life of the Mekong, as we know it now, and these extremes of wet and dry. And so, if the monsoon flood pulse is broken or, for instance, if the river is contained and the pulse effect is lessened, then you don't have the same amount of water going into the Tonle Sap Great Lake. When the—you know, the water comes roaring down the Mekong, and when it gets to about Phnom Penh, the river

divides, and there's obstructions—the river can't take all the water, and so it backs up into the Tonle Sap Great Lake. And so, that's almost like a lung, you know, the expansion and contraction of that great lake is the—as they say, the nursery of Mekong fish. And so, you can't—if you interrupt the flood pulse that's a huge problem.

But, there's no international law, that I know of, no regime that would, in fact, address an issue like the flood pulse. In other words, you have six countries sharing the same river, and any one country disrupts the river, there's an impact on everybody. And it's like the—almost like the prisoner's dilemma, you know—problem, where one person—if they all cooperate, they all benefit. If they don't cooperate, everyone loses.

Senator WEBB. Well, I thank all of you for your information, and analysis and advice. As I said, the implications of this are profound and have an immediacy to them. I think this hearing will help bring greater awareness, here and in other places, of the immediate seriousness of this problem. Hopefully we can move forward to some sort of a structure in which we can start having an impact on these issues. And I have to say, Ms. Chungyalpa, when I tell my brother that there's a 9-foot catfish in the Mekong River, he'll be on the next plane with his rod and reel. [Laughter.]

Ms. CHUNGYALPA. It is on the verge of extinction. He must hurry.

Senator WEBB. Do this before the next couple of years, right?

But, thanks again for taking the time to come and help educate us. We will continue to see if we can't help raise the awareness of this issue.

Thank you.

This hearing's closed.

[Whereupon, at 4:03 p.m., the hearing was adjourned.]

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