Cover: Beinan Estuary, Taitung, Taiwan.
Photo: W.Y. Chiau

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Legislative Reform for Good Governance Through Popular Participation In the Sustainable Development of Wetlands

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Introduction

Recent international, regional and national meetings on the environment recommends development based upon new attitudes towards the value and sustainability of natural resource use, new environmental technologies, new approaches to accounting and auditing charging for the cost of environmental development that is sustainable.

Significantly, the World Bank introduced the concept of good governance which is defined as a " public service that is efficient, a judicial system that is reliable and an administration that is accountable" . The new people-centered approach is ,no doubt, a big push forward in the

work of incorporating the right to a healthy environment and the right to development in the development process.

Another significant aspect of this rapidly changing world in the new millennium is great concern about popular participation for good governance in the sustainable development.

This could be traced to the definition of democracy as " rule by people" which implies participation . Thus, local citizen can voice out opinions in decisions involving conversion of wetlands to new uses. Environmental associations seek to influence governmental rule-making and standard-setting procedures. Public interest groups challenge the role of experts in technical decision-making as well as the legitimacy of the governmental authorities. Indeed, one of the notable achievements of the environmental movement of the recent past is the emergence of a new, vital and truly international NGO-community. They had become the leading voices in debates over sustainable development.

The importance of involving people in the planning process has also been realized by multilateral lending institutions. The Asian Development Bank, for instance, noted: "Mechanisms should be developed by which people directly

affected by environmental changes have a forum to express their views. Very often, environmental impact assessments are made by outsiders who, while their expertise is needed, may nevertheless have perspectives unfamiliar with the needs of the local population. Therefore, public hearings on the environment should be held regularly particularly in those areas where major projects are being organized. Of late, governments and inter-governmental bodies have openly recognized the value of popular participation in official sustainable development-related international negotiations such as those on the Biological Diversity and Climate Change Conventions.

The Right to a Healthy Environment

In recent times, the first identification of the human right to a healthy environment appeared in the UN Declaration on the Human Environment (Stockholm 1972). Principle 1 of said Declaration states: " Man has the fundamental right to freedom and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment of present and future generations."

To date, however, legal experts are still in a quandary regarding the content, effect, and enforcement of such a human right. Some quarters regard the right to a healthy environment as an independent right which thereby imposes obligations upon individual states and the world at large. Others view the same as part of universally recognized rules which states are not allowed to contract out of (ius cogens) per Article 53 of the Vienna Convention on the Law of Treaties (1969) and international customary law (on the assumption that the right has been accepted by the world community). Still, others regard environmental rights as belonging to the grey area between a political guideline and a rule of law; simply stated: a law in the making.

From the human perspective, the human right to a healthy environment could be viewed as a portion of the right to life or the right to dignity. For the indigenous peoples, it means the human right to living. Or, it could be regarded as the mean to combat environmental deterioration as far as it threatens human life.

A very interesting interpretation is the one drawn from the preamble of the 1982 World Charter for Nature which declares: '... Every form of life is unique, warranting respect regardless of its worth to man ...' This statement has led to the issue of awarding rights to subjects other than man, e.g. legal standing to natural entities such as rivers and mountains, the right of species to survive.

Noticeably, the right to a healthy environment is not mentioned in the Universal Declaration of Human Rights. It should be borne in mind, however, that the Stockholm Declaration is considered an authentic interpretation of the notion of human rights embodied in the UN Charter. As such, it provides the minimum standard for the moral duty of states. Furthermore, the UN Commission on Human Rights has put it on record that "States parties to the International Covenant on Economic, Social and Cultural Rights, recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health and agreed, for that purpose, to take steps necessary for the improvement of all aspects of environmental and industrial health".

For our purposes, the best interpretation is the one which regards the environmental right as a traditional human right to be guaranteed by the State. This interpretation could guide governments in their efforts at achieving a clean, livable environment. It could entreat to provide citizens with procedures for participation in decision-making having to do with environmental matter. Incidentally, this is the interpretation used by the Philippine Supreme Court in the case of Oposa et.al. v. Secretary of the Environment and Natural resources (G.R. No. 101083, July 30, 1993) wherein due recognition was given to 'standing to sue' by citizens and NGOs for the environmental right as an inter-generational right. The Supreme Court decided in said case that while the right to a balanced and healthful ecology is guaranteed by the Philippine Constitution, it need not be actually written in the fundamental law of the land as it is assumed from the inception of humankind.

The Right to Development

The UN-Charter describes economic development and respect for human rights as the main foundations of peaceful and friendly relations among

Green Island, Taiwan.
Photo: w. Y. Chiau

nations (Article 55). Under this provision, the UN has a duty to promote development and the mechanism for its realization is the promotion of the right to development.

Thus, Article 1 of the Declaration on the Right to Development stresses the right to development as the right of individuals, groups and peoples to participate in, contribute to and enjoy continuous economic, social, cultural and political development in which all human rights and fundamental freedoms can be fully realized.

The declaration further went on to say that States 'should encourage popular participation in all spheres as an important factor in the development and in the full realization of human rights'.

These statements were strengthened by the 1992 Rio Declaration on Environment and Development which proclaims the necessity for fulfilling the right to development in order to 'equitably meet developmental and environmental needs of present and future generations'. Agenda 21, on the other hand, considers broad popular participation to be one of the fundamental per-requisites for the achievement of sustainable development.

Actually, the Declaration on the Right to development and the Rio Declaration on Environment and Development set in motion the evolution of the right to development as a human right, thus incorporating the issue of the right to development into the mainstream activities of the UN system in the area of development. The Declarations provide the framework within which to stress, in the development context, the interdependence of economic, social and cultural rights and civil and political rights. In connection therewith, countries as well as international bodies should take advantage of the current wave of democratization to further enhance popular participation for sustainable development. In this regard, the role of NGOs including grassroots organizations, is important for the effective implementation of the intents and purposes of the Declaration on the Right to Development especially as it relates to participatory development.

The Right to a Healthy Environment vis-a-vis the Right to Development

The Constitutions of more than 75 States have now declared that the State has an obligation to conserve the environment for the common good and a majority of those States have correspondingly obliged its citizens to protect and manage the environment in a sustainable way. In addition, more than 100 States have enacted environmental legislations during the last decade establishing environmental agencies and creating environmental rights and duties relating to environmental protection and Management.

Be that as it may, there are still doubts as to whether the right to a healthy environment could now be considered as a rule of customary international Law. There is, however, growing evidence that it is a general principle of law.

As an individual human right, the right to a healthy environment is a constitutive element of the concept of the right to development. One conclusion of the Global Consultation on the Right to Development as a Human Right (1990) reads as follows: "... the idea of linking the process of development and individual human rights has gained international legitimacy and broad support. On the question of whether or not the concept of the right to development strengthens or undermines respect for human rights, reference was made to Article 28 of the Universal Declaration of Human Rights which states that an appropriate social and international order is required for the full realization of human rights. The recognition of, and respect for, individual human rights is, however, demanded without any precondition. Moreover, the primary importance of the right to development lies in its undertaking of development as a comprehensive social process which leads to the full realization of human rights through a process that respects individual human rights."

Maipo Nature Reserve, Homg Kong, China.
Photo: W. Y. Chiau

Sungei Buloh, Singapore.
Photo: W. Y. Chiau

Respect for human rights, therefore, should become a factor in the evaluation of the success of national and international development policies. Assessment of the realization of the right to development should include the use of criteria of achievement not only in the areas of civil, political, economic, social and cultural rights but the environmental right as well.

Popular Participation as a Requirement for Good Governance

Popular participation is mainly concerned with involving, informing, and consulting the public in planning, management, and other decision-making activities which can be considered part of the political process. It assures that due consideration will be given to public values when decisions are made. A condition precedent to effective popular participation is the availability of adequate information in public inputs.

Another important aspect of the rapidly changing world is the current concern about popular participation in pursuance of the rights to a sustainable development. Who should participate in the major policy decisions affecting the environment? How could those affected by environmental policy choices be appropriately involved in the decision-making process? Often, representation is claimed to be biased towards small, well-organized groups with few claims to represent the public. Opportunities for participation are also sometimes offered late in the decision-making process when proposals are already developed and accepted by the relevant agency. Indeed, a major problem of environmental policy is how to properly mobilize individual initiative at the right time in the collective interest for sustainable development.

A major requirement of popular participation is provision of environmental/-developmental information. This is best exemplified by public access to information relating to compliance with the environmental impact assessment (EIA) requirement for development projects. A number of procedures in the EIA process provides opportunities for interested groups to inform agency deliberations about their concerns and preferences or to contribute formative ideas to the decision-making process. Sometimes, dissatisfied concerned citizens use available information to block proposals through protest or litigation.

Participation in rule-making and adjudicatory procedures is another manifestation of good governance. Public interest groups use the notice-and- comment provisions. Agencies also use public hearings to gather ideas as a basis for agency action. It is also used to defuse anticipated conflicts or avoid lengthy litigation.

More formal than public hearings are the adjudicatory procedures normally required for the grant of licenses and franchises in such activities as industry siting and power plant operation. The right of citizens to participate in adjudicatory procedures, however, is restricted by the right of agencies to determine who may participate and what issues may be contested. This is also aggravated by the lack of necessary technical and financial resources to present a convincing argument. This is one area of public participation where public financing of citizen's intervention should be seriously considered to ensure appropriate exercise of the right to participate. Public financing could be properly channelled through organized citizen advocacy institutions.

All these mechanisms for popular participation reaffirm the people's right to information on matters of environmental concern. They also ensure the reflection of public preferences in environmental/developmental policies and manifestation of informed consent on matters of sustainable development.

Constraints to Popular Participation

Poverty is possibly the greatest impediment to sustainable development. When people are caught up in the daily efforts to survive they have neither the lime nor the inclination to resist an environmental threat. If people hardly speak up their thoughts, it is seldom likely that they are able to participate in any action or organization that can withstand environmental destruction. This situation is true in rural and urban areas. Conversion of some wetlands into fishponds in many Asian countries were not met with protests by people living close by on account of the expectation of employment or income in the fishpond venture.

Another hindrance to popular participation is illiteracy. To illustrate, environmental threats are often of a technical nature. Illiterate people are not able to comprehend what the presence of a contaminant in their

environment means to their health. In rural areas, such lack of education leads to fatalism. All too often, droughts and floods are believed to be wrath of divine forces , rather than the handiwork of humans.

Inadequacy of political mechanisms also prevents popular participation in environmental issues. Often, the victims of environmental degradation are not heard in parliamentary fora. Politicians are more concerned with short-term gains from development projects and are indifferent or unconcerned about negative impacts of the same in the long term. In addition, some agencies of the government view environmental movements as obstacles to development. This is particularly true in countries where no full-time institutions for environmental protection exist for which reason the watchdog role that the public can play is greatly diminished. Or, far from supporting the public, the State can prove to be the stumbling-block itself. In many countries, the State own huge thermal, hydro-electric and nuclear power plants along with factories which are major polluters of the environment. Unless there are pollution control boards, it is almost impossible to curb pollution from industries in those countries.

Legal Aspects of popular Participation

The most important aspect of popular participation is the people's right to know. Citizens have the right to be informed about threats to their well-being whether it is a factory to be put up in a wetland neighbourhood or an impending change in their natural resource base like a mangrove area. This is an essential democratic precept and the protection of the environment cannot be ensured without safeguarding this fundamental principle. In landmark decisions of the High Court of Bombay and the Supreme Court in New Delhi (India), the right of activist

Bird watching at Sungei Buloh, Singapore.
Photo: w. Y. Chiau

groups to gain access to documents has been legally recognized and these judgements serve as important

precedents. The case arose after members of the Bombay Environmental Action Group and Save Pune Citizens' Committee were refused permission by the Pune Cantonment Board to obtain copies of development plans which would have relaxed building restrictions.

The Ministerial-level Conference on Environment and Development in Asia and the Pacific held in Bangkok in 1990 affirmed " the right of individuals and non-governmental organizations to be informed of

environmental problems relevant to them, to have necessary access to information, and to participate in the formulation and implementation of decisions likely to affect their environment'. The right to know is part and parcel of the democratic process where planning is for the people, by the people.

Unfortunately, both the state and private enterprises find it difficult to part with vital information. Many documents are often classified as 'confidential' or 'secret'. For instance, the authorities putting up the Nam Choan dam in Thailand or Tembeling dam in Malaysia or Chico dam in the Philippines never clearly stated how much forest or wetland areas will be completely submerged as a result or how many people would be affected by the dam project. Factory owners are even more secretive and often seek shelter under the excuse that they cannot part with information on the ground that it would prejudice their industrial processes and commercial secrets.
Perhaps, the most shocking instance of this nature was the statement by Union Carbide that the MIC gas released by their Bhopal plant in central India in 1984 was only a minor irritant to the eyes and posed no other danger. Needless to add, the residents of the surrounding shanty towns who were the primary victims of the toxic gas were never alerted to the hazards or even what precautions could be taken in the event of an accident. As a consequence, many people died in the attempt to flee from the poisonous cloud when they would have been safer remaining in their homes and sealing off all openings.

While citizens have rights concerning the environment, they also have duties relative to protection of the environment. Regrettably, the public can be accused of apathy on several occasions in this regard. An all too common reasoning is the belief that nothing will come out of any attempt at intervention. To some extent, it is understandable if a marginal farmer or a member of a tribe who still lives by hunting and gathering food in a wetland area is guilty of such an attitude. This, however, can scarcely be said of urban people, who are probably the most apathetic of all. Commonly, a factory worker is more concerned about money or compensation in exchange for unhealthy working conditions rather than being conscious of the damage it can cause to his health. Worst, the

public is indifferent about seeking recourse to legal remedies.

Residents of barangay (village) Sawang, Sibutad, Zamboanga del Norte in the Philippines recently scored a victory over a private individual who started to develop a small island by clearing Latungon islet of its mangroves and despite protests from residents, proceeded to construct a rest house, two cottages and a bamboo bridge connecting the islet to the mainland. The clearing was done even before the filing of necessary permit applications. With the help of the ZN Center for Social Concerns & Development (CESCOD) and financial support from the alliance of Mindanao Environmental Defence (AMEND) through the Pagfilingkod Batas Pangkapatiran Foundation (PBPF), 361 residents led by their barangay captain filed a case in court against developer Maghinay. The Municipal Trial Court of Sibutad dismissed and closed the case after the complainants agreed to a settlement with the accused, for humanitarian considerations. Maghinay has agreed to waive his claim over the whole of the subject area in favor of the local residents, transfer to them all improvements, and pay the required forest charges. Although there was no actual compensation made for the community, Maghinay lost about PI 00,000 for all the construction and clearing work, not to mention the attorney's fees. The fishing community is now maintaining the structures in the island and is using it as base of the local "Bantay Dagat" (Sea Watch) to monitor and control illegal fishing in the area. The case of Sawang community only shows that small, resource-poor but vigilant and united communities can successfully defeat big and powerful perpetrators of environmental destruction.

Another example of positive local people intervention is illustrated by a Malaysian experience specifically in Kampong Kuanton, 18kms. from the estuary of the Selangor River where mangroves attract a species of firefly which produces synchronized flashing pattern, resembling the blinking lights of a decorated Christmas tree. A local entrepreneur developed a commercial boating enterprise allowing tourists to observe the fireflies, which led to some form of tourism in the area. The firefly habitat, however, is threatened by a river diversion project upstream which will result in decreased freshwater flushing as well as uncontrolled tourism development in the area. In response, several local stakeholders,i.e. the village security and development council and the local entrepreneur, got involved in the site's management through provision of technical assistance, advice on conservation and management issues and dissemination of educational and awareness materials on the sustainable development of the Christmas Tree-like mangroves.

Recent case studies reveal abundance of public participation experience in the management of mangroves. Community involvement initiatives include

- involvement of village-level technicians in the maintenance and repair of small tractors and water pumps, organizing people for skills training in poultry raising, goat farming, fisheries management in the Koshi Tappu Wildlife Reserve in Nepal.
- Formal and informal discussion, personal communications, in depth-interview, group discussion and household survey to collect inputs for drafting the management plan of the Sam Roi Yat wetlands in Thailand.
- Local authorities, conservation organizations and citizens got involved in helping to manage the Yatsu Higata Tidal mudflat in the Tokyo Bay (Japan) area which face constant threats relating to water quality coming from Tokyo Bay. (Yatsu Higata plays an important role as a staging and wintering site for migratory waterbirds on the East-Asia Australasia Flyway).

Yamaguchi Prefectural Kirarahama Nature Park, Japan.
Photo: W. Y. Chiau

Legislative- Reform to Incorporate Public Participation in Sustainable Development: The Philippines

Popular participation largely depends upon public perception and attitude towards environmental issues. Such perception and attitude underwent considerable change during the 1970s when the emphasis was for strong environmental legislation and technological solutions to environmental problems through efforts of individuals, local groups and communities. In this regard, the Philippines went a step further when, in 1992, it incorporated direct public participation for sustainable development in a legislation with the closest bearing to wetlands management in the context of Philippine environmental jurisprudence. Referred to here Republic Act 7586, otherwise known as the National Integrated Protected Areas Act (NIPAS Law). The law lays down a process for the formulation, preparation and approval of management plans with the participation of local people as well as direct participation by people in protected area management.

Specifically, the law adopts a two-tiered management plan. There shall be a general management planning strategy on the first level, to serve as a guide in formulating individual plans for each protected area. The on-site plan on the second level will effectively address peculiar situations in the area. It will also afford a more direct participation by the private sector in protected area planning and management through the management board. Most important of all, participation of indigenous and other local communities is included in the management scheme.
This is on the theory that community benefits from the protected area in the form of livelihood sources are essential to the successful management of protected areas. In reality, the management board takes the role of a local protected area administrator.

Public participation under said Law was further strengthened when, in 1994, the Department of Environment and Natural Resources issued Administrative Order 2 to implement the NIPAS Law. To be more specific, the basic policy of the rules and regulations as laid down in Administrative Order 2 is to ensure recognition of the customs and traditions of indigenous cultural communities in their ancestral domains and the importance of promoting indigenous ways,such as ecologically sound traditional practices for the sustainable development of natural resources including, but not limited to, wetlands. In furtherance of this policy, indigenous communities are to exercise general supervision and control over the management of their claimed ancestral domains, including the resources found therein. For this purpose, the council of elders of each community is recognized as the decision-making and management body within the domain. Implementation of government programs under the control of the DENR requires the consent of the indigenous cultural community concerned, written and signed on its behalf by a majority of its recognized leaders. Once such consent is given, the community must be allowed to participate in the planning, implementation and maintenance of the program. The rules and regulations require the preparation of a comprehensive, ances tral-domain management plan by each indigenous community that takes into consideration indigenous land use and systems of tenure including customary laws, beliefs, and traditional practices.
Also to be considered are the question of indigenous community participation in the protection, conservation, development, and maintenance of indigenous communities' rights over their sources of livelihood as well as the question of the provision of supplemental sources of livelihood.

Conclusion

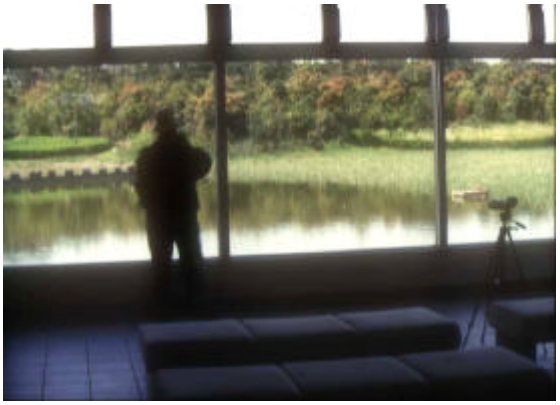
This is, indeed, a time of change and choices to achieve good governance for sustainable development. Whether one looks at the right to a healthy environment as a traditional right, an independent right or as part of an existing right, i.e. the right to life, or as an element of or complementary to the right to development, is not of much importance. What is important is the evolution, out of those rights, of eco-legal principles that seek to enhance popular participation to attain sustainable development of the world's natural resources including wetlands.

Yamaguchi Prefectural Kirarahama Nature Park, Japan.
Photo: W. Y. Chiau

Wetland Conservation in Asia and Activities of NGOs

Reiko Nakamura

Secretary General, Ramsar Center Japan



The Yatsu Higata, a tideland Ramsar site in Tokyo Bay, Japan.
Photo: W. Y. Chiau

What is Ramsar Center Japan

The Ramsar Center Japan is a non-governmental organization that was established in 1990, in Tokyo, Japan, aiming to promote the wise use of wetland and its resources and foster the mission of the Ramsar Convention or the Convention on Wetlands among Asian countries. Presently it consists of 120 individual members who voluntarily pay membership fees annually. They are mostly university professors, scientists, journalists, government officials, NGO activists, housewives and students from Japan and other Asian countries such as Malaysia, Indonesia, Bangladesh, India, Nepal, Philippines, Thailand, Australia, Taiwan, China and Korea. It has no permanent staffs, independent office and relief fund as foundation. It does not receive any subsidy from the government and/or other funding agencies for its routine work.

It sometimes gets support from several organizations on the project bases. Those are, however, temporary sponsors and do not support the pillars of RCJ. In other words, it is a completely voluntary organization that is basically run by the collected membership fees and part time workers as volunteers. It will be easily imagined that the scale of manpower and money source of RCJ is not big and solid. The activities of RCJ, however, are not small and insufficient.

The objectives of RCJ are to enhance public awareness on conservation and wise use of wetlands, to ensure local people's participation in wetland management and to implement the above two objectives through networks and partnerships among all sectors related to wetlands.

It promotes research and data collection on wetlands, in particular, relations between people and wetlands, and supply information and resource materials for education and public awareness as newsletter, booklet, website and video. A number of international workshops and symposiums related to wetlands have been organized by RCJ in collaboration with its Asian counterpartners in these 12 years since its establishment in 1990.

The Ramsar Convention:

Wetlands are among the most valuable ecosystems bringing benefits to millions of people in the Asia region. Asia's large population has derived much of its sustenance from wetland and its resources. This trend is prevailing and will continue in the future. However, due to persistence poverty, rapid population growth and its uneven distribution, high urbanization and industrialization, over exploitation of resources especially forests, water and air pollution, haze, rapid economic growth of the past decades: wetland and its resources are alarmingly being depleted in this region. Consequently, the quality of life has been deteriorating due to the loss and extinction of wetlands. Recognizing the importance of wetlands, the Convention on Wetlands was adopted in 1971 to ensure and promote wise use of wetland, its resources and biodiversity, so that it can continue to provide benefits to the present and future generations. As it was signed in Ramsar, Iran, it is called the Ramsar Convention. It is the first intergovernmental treaty which provides the framework for national action and international cooperation

Watzewei, a mangrove protected area in north Taiwan.
Photo: W. Y. Chiau

for the conservation and wise use of wetlands and their resources. According to the Ramsar Convention, "wetlands" has very wide or broad definition. It is saying that wetlands are "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide dose not exceed six metres" (Ramsar Convention, Article 1.1) Also, it defines wetlands "may incorporate riparian and coastal zones adjacent to wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands." (Ramsar Convention, Article 1.2)

The Convention encourages the Contracting Parties to commit themselves to:

- Designate at least one site that meets the Ramsar criteria for inclusion in the List of Wetlands of International Importance (the Ramsar List), and ensure the maintenance of the ecological character of each Ramsar site. Countries are expected to include in the List as many wetlands that meet the criteria as possible. Listed sites do not necessarily require protected area status, provided their ecological character is maintained through a wise use management approach;
- Include wetland conservation within their national land-use planning, so as to promote the wise use of all wetlands within their territory;
- Establish nature reserves on wetlands, and promote training in wetland research, management and wardening;
- Consult with other Parties about the implementation of the Convention, especially with regard to transfrontier wetlands, shared water systems, shared species, and development projects affecting wetlands.

The number of Contracting Parties(CPs) to the Convention is 133 as of October 2002. One thousand and one hundred ninety eight wetlands are designated for the List of Wetlands of International Importance, and the total surface area becomes 103.4 million hectares.

The Ramsar Convention divides the world into 5 geographical regions namely, Africa, Asia, Europe, Neotropics, North America and Oceania. The Asia region originally covers a huge area contains 42 countries from further east like Japan to middle east like Iran. Today, 24 countries of those 42 countries in the region or 57 % are the CPs of the Convention, namely Azerbaijan, Bahrain, Bangladesh, Cambodia, China, India, Indonesia, Islamic Republic of Iran, Israel, Japan, Jordan, Lebanon, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Republic of Korea, Sri Lanka, Syrian Arab Republic, Tajikistan, Thailand, Uzbekistan, Vietnam. One hundred and thirty wetlands are designated as the Ramsar sites in the region and the total area becomes about 8.1 hectares. I have to say that many countries, a lots of sites and huge wetlands area in Asia are still remained out of the umbrella or network of the Ramsar Convention.

The Ramsar Convention and NGOs

The Convention recognizes that NGOs, both internationally and nationally, are the essential organization partners to that "contribute on a regular basis and to the best of their abilities to the further development of the policies and technical and scientific tools of the Convention and to their application". So far, four international non-government organizations that have been associated with the Convention since its inception have been recognized as internatioal Organization Parners to the Conventiont. They are BirdLife International, The World Conservation Union (IUCN), Wetlands International and World Wide Fund for Nature (WWF). On the website of the Ramsar Convetnion, more than 60 websites of NGOs are listed as important sites for Ramsar related information, and that of Ramsar Center Japan is listed.

Wetlands and NGOs in Japan

In Japan, nowadays, there are thousands of NGOs that are working on environment. In early 1990's, Japan hosted two important environmental conference, COP9 to CITES in 1992 in Kyoto, and COP5 to the Ramsar in 1993 in Kushiro. Those experiences triggered the NGO activities on nature and natural resources in Japan. In particular, from 1993, many local-based NGOs on wetland conservation were emerged very actively and positively. However, there is no whole catalogue or directory.

In the Directory of Water Related International Cooperation", which was published by Japan Environment Agency and International Lake Environment Committee(ILEC) in 1995, 23 NGOs that are working on some international project on related to water were listed up.

Those are:

- Kushiro International Wetland Center(KIWC)
- International Lake Environmental Committee(ILEC)
- Kitakyushu International Techno-cooperative Association(KITA)
- International Society for Mangrove Ecosystems(ISME)

- Overseas Environment Cooperation Center(OECC)
- The Organization for Industrial, Spiritual and Cultural Advancement International(OISCA)
- World Wide Fund for Nature-Japan(WWF-J)
- International Waterfowl and Wetlands Research Bureau-Japan(IWRB-J)
- Wild Bird Society of Japan(WBSJ)
- Ramsar Center Japan(RCJ)
- Friends of Earth-Japan

In 1995, IWRB was restructured and re-organized as Wetlands International and WI-J, or former IWRB-J contains several wetland NGOs as its members.

Those are:

- Swan Society of Japan
- Japan Hunter's Association
- All Japan Hunting Club (AJHC)
- Wild Bird Society of Japan (WBSJ)
- Yamashina Institute for Ornithology
- World Wide Fund for Nature Japan (WWF Japan)
- Kushiro International Wetland Centre (KIWC)
- Japanese Society for Preservation of Birds (JSPB)
- The Ornithological Society of Japan
- Japanese Association for Wild Geese Protection (JAWGP)
- Japan Wetlands Action Network (JAWAN)
- Japan Crane Network (JCN)
- Naka-no-Umi Waterbirds International Exchange Foundation

According to the "Inventory of Environmental NGOs", published by Japan Environment Association in 1998, among 4227 NGOs listed in the above, 611 NGOs are doing some activities related to "water".

Wetlands and NGOs in Asia

During the last decade, the condition and status of NGOs in the Asian region has been drastically changed. In some countries, before, NGOs has been just recognized as AGOs or Anti Government organizations and seen with doubt. Recently a lot of NGOs are taking roles as real partners to the governments, and implementing indispensable activities. What is more, some NGOs even lead the governments and produce good environment governance.

When Ramsar Center Japan has organized the Asian Wetland Symposium in 1992, Japan, there are only 11 contracting parties to the Ramsar Convention. The symposium has been successfully held being participated by 250 participants, however, only 30 participants could join from the Asian region. Most of the Asian participants were representation of governments, there were not many NGO representatives. In 2001, RCJ has organized the Asian Wetland Symposium 2001(AWS2001) as the second meeting, in Penang, Malaysia. In 2001, the numbers of contracting parties to the Ramsar Convention in the region were 22, doubled than that of 1992. The AWS2001was very successful being participated by some 370 participants from 37 countries and adopetd the Penang Statement. Most of the participants were from non-governmental organizations related to wetlands such as University, research institutes or NGOs in the region.

In spite of the above better condition, I have to say that the status of conservation and wise use of wetlands in the region is not sufficient. As I mentioned before, due to many human impacts on the nature, wetland and its biodiversity are alarmingly being depleted in this region. The public awareness and education on wetland conservation are still very much needed.

In order to promote its essential objectives on wetland awareness and education in the region, we are going to initiate the awareness campaign of "Asian Wetlands Week Celebration: Children love wetlands, wetlands love children" on 2-8 February 2003 as its first implementation. We are encouraging our Asian partners to participate in the above campaign and till now, individuals and organization from 10 countries have expressed their positive intention to join the Asian Wetland Week Celebration. Details will be informed from RCJ website http://homepage1.nifty.com/rcj/.

Does Mussel Watch work –Selection of bioindicators for monitoring marine environmental quality in the Bay of Fundy, Atlantic Canada.

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Photo: W. Y. Chiau

Introduction

The Bay of Fundy, on the east coast of Canada, has an unique and important biological, physical, and oceanographic environment which supports many commercial and non-commercial species. Within the Bay of Fundy, various levels of activity are evident, for example, an industrialised harbour at Saint John, a potential marine protected area at Musquash, an area of intensive salmon aquaculture farming in southwestern New Brunswick. To date, the marine environmental quality (MEQ) for the Bay of Fundy, has been assessed using predominantly water and sediments (Loring *et al*., 1996; Wells *et al*., 1986; Ray and MacKnight, 1984), with some biota contaminant studies that focused on blue mussels in the Gulf Watch Programme (Chase *et al*., 2001). Thus it is necessary to further assess the eco-health of this marine environment by choosing biondicator species that provide accurate, reliable measurements of environmental quality as required in the Oceans Act of Canada (Canada Oceans Act, 1996)
The objectives of this paper are 1) identify species that are indicators of environmental quality 2) present the geographical distribution patterns of metal and organic (PCB's and PAH' s) contaminants in the American lobster (*Homarus americanus*), blue mussel (*Mytilus edulis*), and sediments for developing a monitoring tool to assess marine environment.

Materials and Methods

Market size lobsters (~450 g) were purchased from lobster fishermen at sample sites in the Inner Bay of Fundy: Cobequid Bay, Minas Basin, Minas Channel, Saint John Harbour (Chou *et al*., 2000), Annapolis Basin, and Pubnico (Chou *et al*., 1998) (Figure 1). Sediments were also collected at the lobster sites (Chou *et al*., 1998; Loring *et al*., 1996). Blue mussel contaminant data collected since 1991 for the Gulf Watch programme for monitoring metal and organic contaminants in the Gulf of Maine and the Bay of Fundy including sites at Five Islands, Apple River, Digby, Broad Cove, Annapolis Causeway, Yarmouth, Argyle, and Saint John Harbour Tin Can Beach (Chase *et al*., 2001, Jones *et al*., 2001)) was utilized as well (Figure 1).

For lobsters, biological parameters were recorded, digestive glands were excised, and placed separately in Whirl-Pak© bags. Samples were homogenized by hand-kneading and then acid digested. Metal analysis was carried out using a Perkin-Elmer Model 403 flame atomic absorption spectrophotometer equipped with deuterium arc background correction (Chou *et al*., 1987). Sediment and lobster metals were analysed as described in Chou *et al*. (2000). Concentrations determined for metals are in µg/g wet weight for lobsters and in dry weight for sediments. Total organic carbon in sediments was determined based on the Walkey-Black method (Walkey, 1947) which differentiates humus matter from extraneous sources of organic carbon such as graphite and coal. For PAH' s and PCB' s, lobster digestive gland tissue and sediments were extracted and the extracts were prepared according to King *et al*. (1993). Extracts were analysed by gas chromatography (Hewlett-Packard, 5890 Series II gas chromatograph) with mass spectrometry (Hewlett-Packard, 5971

Mass Selective Detector) (GC/MS) in both full scan and selective ion monitoring (SIM) modes.

Procedures for organic contaminant determinations are described in King *et al*. (1993) and King *et al*. (1996). Concentrations determined for PAH' s (polycyclic aromatic hydrocarbons) and PCB's (poly- chlorobiphenyls) are reported in ng/g wet weight for lobster and dry wet for sediments.

Results and Discussion

Metals

Table 1 contains the metal concentrations (Ag, Cd, Cu, Zn) for mussels, lobster and sediments from the Bay of Fundy. The mussel data reported by the Maine Council Gulf Watch Programme (Chase *et al*., 2001; Jones *et al*., 2001), is included for comparison with our Bay of Fundy lobster and sediment contaminant results to assess whether the spatial distributions of contaminants are truly reflective of the environment in the Bay. Relatively constant levels of Cu were observed in mussels from the Inner Bay stations. Gulf Watch reports high Cu values in mussels collected from Tin Can Beach, Saint John Harbour in 1998. Mussel cadmium ranged from 1.5-2.7 µg/g and Zn from 55-139 µg/g (dry weight) which is relatively uniform (Chase *et al*., 2001). Ag is accumulated in very small amounts or was undetected.

Sediment metal concentrations (Cu, Cd, Zn) in the Bay of Fundy are within the range reported for the Maritimes region (Loring *et al*., 1996) and are low. Carbon ranged from 0.3-1.8 % for all survey sites, and the 1.8% organic carbon from Saint John Harbour dumpsite sediments is the same as that reported by Wildish and Thomas (1985). Ray and MacKnight (1984) also reported that heavy metal concentrations in the harbour were surprisingly low, near background concentrations for the Bay of Fundy. The relatively low metal concentrations in dumpsite sediments may be attributed to the thorough and rapid dispersion at the dumpsite location into the Bay of Fundy.

The highest metal concentrations (22.9 µg Cd/g, 856 µg Cu/g, 11.5 µg Ag/g, and 129 µg Zn/g) in lobsters were observed near the more sheltered inner part of the bay, and levels decreased toward the outer Bay of Fundy, except at Saint John Harbour, the industrial dumpsite. The copper values ranged widely by more than 80 fold, Ag by more than 14 times, Cd by 4.5 times, and Zn by 4.8 times. Extremely high digestive gland Cu, over 800 µg Cu/g was detected in lobster from the Inner Bay at Cobequid and Cumberland Basin. In more open, deeper water areas such as the Minas Channel, away from the Inner Bay, less Cu in lobster

Table 1. Metal concentrations (Ag, Cd, Cu, Zn) in mussel tissue (µg/g dry weight), lobster digestive gland (µg/g wet weight), and sediments (µg/g dry weight) from the Bay of Fundy.

Mussels (µg/g dry wt.)					*Lobster (µg/g wet wt.)*					*Sediments (µg/g dry wt.)*				*Organic*
SITE	*Ag*	*Cu*	*Cd*	*Zn*	SITE	*Ag*	*Cu*	*Cd*	*Zn*	*Ag*	*Cu*	*Cd*	*Zn*	*Carbon (%)*
Inner Bay of Fundy														
Nova Scotia Coast														
Five Islands	ND[b]	5.8±0.2[a]	2.33±0.15[a]	55±4[b]	Cobequid Bay	11.5* ±0.4	856* ±40	20.5* ±0.4	40.9* ±0.5	ND	17.0* ±2.6	0.02* ±0.03	48.9* ±5.7	0.7* ±0.3
					Minas Basin	10* ±0.1	405* ±20	22.9* ±0.1	129* ±13	ND	9.3* ±2.5	0.03* ±0.01	35.1* ±3.0	0.3* ±0.1
					Minas Channel	2.9* ±0.1	110* ±25	16* ±1.0	35.1* ±1.7	ND	16.2* ±3.8	0.02* ±0.01	46.1* ±4.8	0.4* ±0.2
Near New Brunswick and Nova Scotia Coasts														
Apple River	ND[b]	6.6±0.05[b]	2.7±0.32[b]	75±5[b]	Shepody Bay	10.8* ±1.5	637* ±36	15.4* ±0.6	35.1* ±1.7	ND	15.0* ±2.9	0.03* ±0.03	58.6* ±9.5	0.9* ±0.6
					Cumberland Basin	2.5 ±0.3	836* ±17	15.2* ±0.5	28.0* ±3.3	ND	16.8* ±0.8	0.03* ±0.01	65.5* ±6.0	0.9* ±0.1
Saint John Harbour														
Tin Can Beach	0.16±0.01[c]	29±8[c]	2.50±0.30[c]	110±24[c]	Dumpsite	7.0* ±0.7	317* ±16	11.6* ±1.2	35.1* ±3.8	ND	19.2* ±4.9	0.11* ±0.01	69.4* ±7.7	1.8* ±0.4
Annapolis Basin														
Digby	0.08±0.05[c]	7.0±0.8[b]	1.54±0.58[b]	91±13[a]	Annapolis Basin	2.4* ±0.1	70.5* ±2.8	9.0* ±0.5	44.7* ±1.8	ND	12.0[d] ±2.2	0.04[d] ±0.01	39[d] ±4.6	0.6[d] ±0.2
Broad Cove	ND[c]	5.8±0.4[a]	1.70±0.01[c]	95±12[a]										
Outer Bay of Fundy (southwest N.S.)														
Yarmouth	0.23±0.09[a]	7.7±0.7[a]	2.00±0.14[a]	123±15[a]	Pubnico	0.8* ±0.3	10.4* ±3.6	5.1* ±0.4	27.7* ±1.2	NA NA	NA NA	NA NA	NA NA	NA NA
Argyle	ND[a]	6.6±0.3[a]	2.70±0.32[b]	78±6[a]										

a is 1996 collection (Chase *et al*., 1997)
b is 1997 collection (Chase *et al*., 1998)
c is 1998 collection (Chase *et al*., 2001)
d Metal data from Loring *et al*., (1996)

*pooled samples:
For lobster pools n=30 (15 males, 15 females)
with standard deviation for male and female lobster pools
For sediment pools, n is between 6-10.
NA: data not available
ND: not detected

Yamaguchi Prefectural Kirarahama Nature Park, Japan.
Photo: W. Y. Chiau

was detected.

It is unknown if the source of Cu discharge, was related to natural geographic distribution or agricultural activity. Previous studies with lobsters captured from the Maritimes indcated that Zn is regulated between 20-40 µg/g wet weight in digestive gland. (Chou *et al*., 2000; Chou *et al*., 1998). Thus the extremely high concentrations of Zn in lobsters from Minas Basin indicate the presence of unknown source(s) of Zn and further investigation is required to identify the source. Cd concentrations in lobsters from the Inner Bay are also more elevated than those reported for lobster from other Maritime areas, with the exception of Belledune Harbour, New Brunswick which is associated with smelter effluent discharge (Chou *et al*., 2000; Chou *et al*., 1998). High Ag concentrations in lobster from Inner Bay areas may be related to elevated Cu, since Ag increases as Cu increases (Chou *et al*., 1978).

The uptake of Ag in invertebrates is part of a detoxification mechanism for coping with high Cu concentrations in the environment (Chou *et al*., 1987). Elevated metals were also found in crabs from the same areas (Chou *et al*., 2002) and prove that there is high concentrations of metals in the Inner Bay environment.

Among the three sample types (lobster, mussel, sediments), lobsters had the highest metal concentrations, for example, Cu concentrations in lobster were about 2 or 3 orders of magnitude higher than those found in mussel and sediment. Mussels had higher levels of Cd and Zn compared with the sediments, but sediment Cu was higher than that in mussels in most areas, with the exception of Tin Can Beach in Saint John Harbour (located near municipal sewage run-offs). From these results it is clear that, based on the concentration levels for these three metals in the tissues, mussels had far lower concentrations than lobster, in the Bay of Fundy. Metal concentrations in lobster, mussels, and sediments from the Bay of Fundy can be presented in the following order from highest to lowest:
Ag: lobster > mussel ≥ sediments,
Cd: lobster > mussel > sediments,
Cu: lobster > sediment > mussel,
and Zn: lobster > mussel > sediments,
indicating a greater capacity for the metals uptake and accumulation by lobsters.

Organic Contaminants

Table 2 shows the concentrations of total PAH' s and PCB' s in Bay of Fundy lobsters, mussels and sediments. PAH' s in lobster digestive gland from Cobequid, Minas Channel, Saint John dumpsite and Pubnico showed slightly higher levels relative to the other sites; PCB's were slightly higher in Shepody Bay and Saint John dumpsite lobsters. For lobsters from all sites in the Bay of Fundy, both organic contaminants were low and within background levels compared with levels in the lobsters from contaminated harbours such as Halifax or Sydney, Nova Scotia reported by King *et al*., (1993, 1996), and Uthe and Musial (1986). They reported levels up to 1400 ng PCB's/g wet wt. and 2,200 ng PAH' s/g wet wt. for Halifax Harbour; and 1900 ng PCB's/g wet wt and 14,000 ng PAH' s/g wet wt. for the South Arm of Sydney Harbour. Halifax Harbour contamination is related primarily to the discharge of untreated sewage, and Sydney Harbour received the discharge from coke ovens and tar-ponds.

Gulf Watch mussel PAH's and PCB's values are presented in Table 2. The PAH values show some elevation for Saint John Harbour, Annapolis Basin (Digby, Broad Cove) and Yarmouth. PCB's were not detected in the majority of mussel collection sites, except at the Saint John city sewage outfall of Tin Can Beach, and at Digby, N.S., but even these values were similar to the mussel mean value. Mussel organic contaminants for the Bay of Fundy are within the 85% confidence intervals for all the Gulf Watch survey sites, the values do not exceed health limits (Chase *et al*., 2001), and are lower than NOAA Mussel Watch Project values (O' Connor and Beliaeff, 1995). Organic contaminants were detected in mussels at some sites, however lobster yield detectable levels at all sites. For sediments, there were no detectable PAH' s or PCB' s at any sites. For the Bay of Fundy study area, organic contaminants are found in more detectable levels in lobsters compared with either mussels or sediments. This suggests that lobster should be the more sensitive animal to use as an index species for monitoring contaminants.

Spatial Distribution of Contaminants

In the Inner Bay of Fundy, there is a definite pattern to the spatial distribution of Cu, Cd, and Ag in lobsters, with the highest levels in the inner part of the bay, and declining levels at locations in more open, deeper waters (Figs. 1a-b). High concentrations are also detected in lobsters collected from industrialised harbours, including Saint John Harbour. There is no correlation between sediment and lobster metal concentrations in the Bay of Fundy (Table 1, Figs. 1a-b, 1e-f). Metal results for Gulf Watch, an international monitoring program using *Mytilus edulis* as the sentinel species for habitat exposure to toxic contaminants in the Gulf of Maine, are relatively evenly distributed throughout the study area, including the Bay of Fundy, with no apparent spatial trends, but with the occasional hot spot of elevated concentrations (Jones *et al*., 1998) (Figs 1. c-d). The lack of a pattern in the spatial distribution is related to the regulation of internal metal concentrations by

the mussels (Amiard-Triquet, 1986; Phillips, 1976). As a result, Amiard-Triquet concluded that the use of mussels as a bioindicator of pollution seems doubtful for metals, since the levels of these trace elements in the organisms are largely independent of their concentration in the ambient seawater. Phillips also suggested that the mussel should not be used as an indicator of copper in the marine environment. The effects of other metals on the net uptake of copper could not be easily eliminated or allowed for, and the net uptake of copper by the mussel was extremely erratic and affected by salinity, temperature, other metals and changes in their relative concentrations.

In the case of organic contaminants, there is a lack of spatial trends in distribution for either mussels or lobsters in the Bay of Fundy. Some factors influencing the observed PAH and PCB levels include:

- at the sites surveyed it is difficult to assess the accumulation of compounds especially when the concentrations are low
- the variation between locations depends on the type of compounds present in the environment; i.e. the lower chlorinated components are more rapidly metabolized and excreted than the highly chlorinated biphenyls which persist in the tissues. Similarly, low molecular weight PAH' s have lower retention rates than high molecular weight compounds in organisms (Pruell *et al*., 1986)
- the lipid content affects the uptake of organic contaminants (Solbakken *et al*., 1984)
- organic contaminants are metabolized rapidly and depurated without major accumulation in the organism (Pruell *et al*., 1986; Uthe *et al*., 1986; Hansen *et al*., 1978).

For mussels, body condition can be influenced by the nutrition and food availability in the environment, which also influences the lipid content. Environmental factors such as organic carbon levels, contaminant interactions, varied tidal ranges, and temperature variations also affect the bioaccumulation of contaminants in mussels (Phillips, 1977). In response to decreasing tissue weight as mussels starve, some elements are excreted, while others are not eliminated (Chou and Uthe, 1991). These factors may contribute to the high variability between sites and the lack of detection of spatial distribution, thus, complicating the use of mussels for monitoring contaminants as true reflections of the environment in the Bay of Fundy.

Table 2. Total PAH's and PCB's in mussel tissue (ng/g, dry weight) and lobster digestive gland (ng/g, wet weight) from the Bay of Fundy.

Mussels (ng/g dry wt.)			***Lobster (ng/g wet wt.)***		
SITE	***å PAH 24***	***å PCB 24***	**SITE**	***å PAH***	***å PCB***
Inner Bay of Fundy					
Nova Scotia Coast					
Five Islands	41±22[a]	ND[b]	Cobequid Bay	275	76
			Minas Basin	190	94
			Minas Channel	255	70
Near New Brunswick and Nova Scotia Coasts					
Apple River	ND[b]	ND[b]	Shepody Bay	150	190
			Cumberland Basin	92	74
Annapolis Basin					
Digby	198±50[b]	3.5±0.43[c]	Annapolis Basin	16	67.2
Broad Cove	133±17.8[c]	ND[c]			
St.Croix	28±37[c]	ND[b]			
Saint John Harbour					
Tin Can Beach	164±12.4[c]	33±5.2[c]	Dumpsite	300	120
Outer Bay of Fundy (southwest N.S.)					
Yarmouth	171±53[a]	ND[a]	Pubnico	318	95
Argyle	60±16[c]	ND[a]			

Note: For sediments from all sites, PAH's and PCB's were undetected.
a is 1996 collection
b is 1997 collection
c is 1998 collection
For lobster pooled data n=30.
ND: not detected

Selection of Bioindicators

A good bioindicator accumulates contaminants from the environment and accurately reflects the environmental levels. The lobster has been shown to be a reliable species for monitoring metals (Cu, Ag, Cd, Zn, etc.) (Chou et al., 2000, 1998; Chou and Uthe, 1978) because it is:

- abundant in many coastal areas,
- benthic and lives in direct contact with the sediments,
- known to concentrate chemicals in their tissues (Chou et al., 1987, 1998; Bryan, 1968), and
- mobile within relatively large areas and is not confined by physical environmental factors (i.e. currents, tides associated with contaminant exposure) for

monitoring the contaminants. Lobsters are high in the food chain and s cavenge on other marine biota. In a study of metals in rock crab, a lobster dietary species collected at the Bay of Fundy lobster sites, Cu, Cd, Zn, and Ag were also elevated (Chou et al., 2002). In contrast, the Gulf Watch Mussel Programme study in the Bay of Fundy, did not reveal the problem of high Cu, Cd, and Zn in the Bay of Fundy marine ecosystem.

There are various problems for contaminant monitoring when using mussels:

- the levels for mussels in the survey area generally are low, and below the detection limit of the analytical method,
- the physical hydrodynamic conditions may vary from area to area and influence uptake, especially given the strong current flow in the Bay of Fundy, and the extreme tides. Other issues such as seasonal variation and nutrients will affect metal uptake.

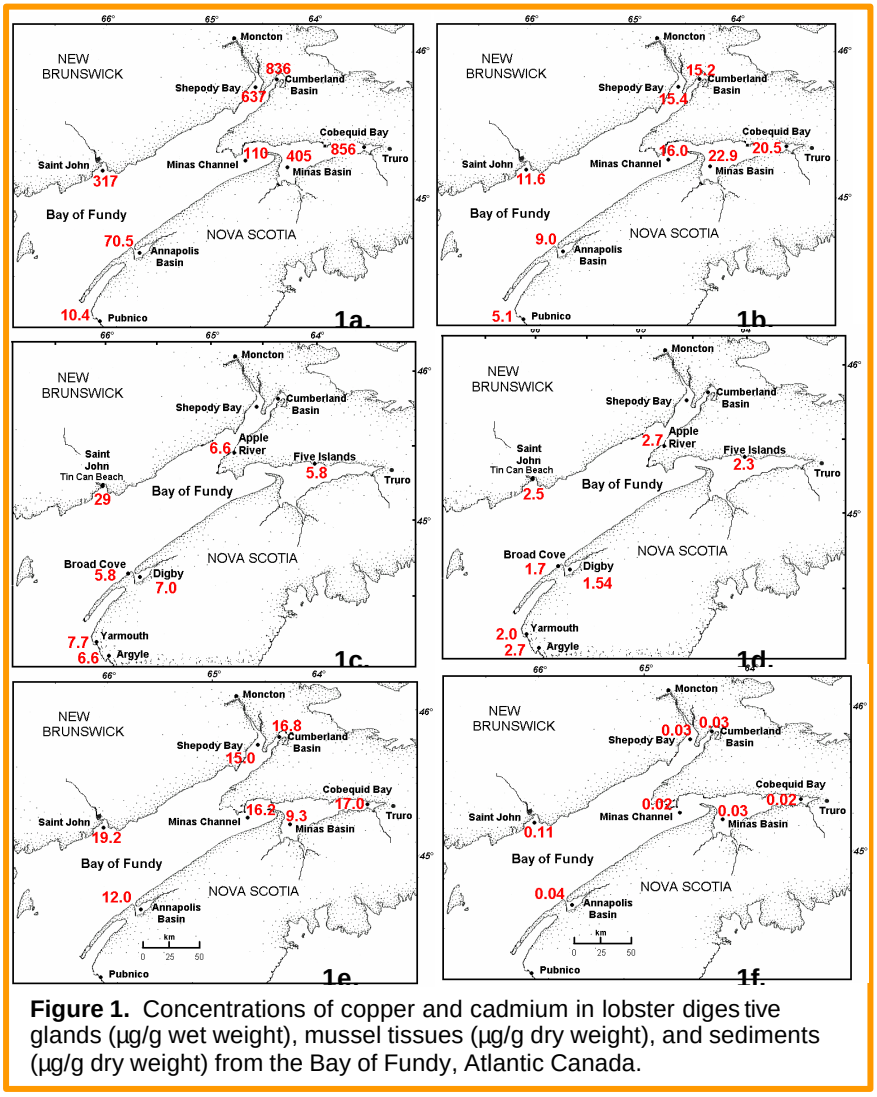


Figure 1. Concentrations of copper and cadmium in lobster digestive glands (µg/g wet weight), mussel tissues (µg/g dry weight), and sediments (µg/g dry weight) from the Bay of Fundy, Atlantic Canada.

Like mussels, sediments also fail to reveal the metal problems. The lack of a sediment-organism relationship agrees with previous findings for biota and associated sediments (Chou et al., 1999; 1998). Metal levels in sediments depend on local variations related to the rate of metal deposition and particle sedimentation, particle size and nature and presence or absence of organic material (Phillips, 1977). In addition, sediment metals give little direct information on the amounts of metal entering the biomass of a given area. Organic carbon in Bay of Fundy sediments (Table 1) are within the normal range of values, and, although Cu is known to bind to organic carbon, the organic carbon is not elevated at the highest sediment Cu site, nor at the highest lobster Cu sites in the Inner Bay. This suggests there are complications in the use of sediments as reliable sample material for monitoring contamination in the marine environment.

Conclusions

This study underscores the ineffectiveness of mussels and sediments as reliable indices of contaminants, and that the lobster is the better bioindicator for monitoring contaminants in the coastal environment of the Bay of Fundy. Analytes below the detection limit, found for the mussels, increases the difficulties of chemical analysis and detection for environmental monitoring. Selection of a proper bioindicator species as a tool for assessing environmental change is essential for monitoring and establishing MEQ guidelines for the Bay of Fundy and elsewhere. The source of discharge affecting the immediate environment and impacts to endangered and other species in the Bay such as salmon, striped bass, other fish and invertebrates should also be examined for assessing the eco-health of the Bay of Fundy.

Climate Change and Wetlands

(Interim Executive Summary to Ramsar COP8- DOC. 11)

The 8th Meeting of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971)

Valencia, Spain, 18-26 November 2002

Ramsar COP8 Venue in Valencia, Spain.
Adapted form Ramsar web

Ten questions were developed by the 10th meeting of the STRP for summarizing the importance of wetlands, the impacts of climate change on wetlands, potential adaptation options and the role wetlands can play in mitigation of climate change. This Interim Executive Summary addresses these questions; underlying scientific and technical details are provided in COP8 DOC. 11.

What are the goods and services that wetlands provide?

Wetlands provide goods and services essential for the survival of humans. Goods and services that wetlands, like many ecosystems provide are: food, fibre (wood, reed thatching), clean water, clean air, carbon and other nutrient stores/sinks, flood and storm control, ground water recharge and discharge, pollution control, organic matter or sediment export, biodiversity, pollination, routes for animal and plant migration, landscape and waterscape connectivity, aesthetic/spiritual, cultural and recreational services (see Figure 1). These all contribute to human health and well-being.

What is the role of wetlands in the global biogeochemical cycles and how do human activities affect this role?

Terrestrial wetlands have a major role in the carbon, nitrogen and sulphur cycle. All these cycles are driven by the hydrological (or water) cycle. Since the 1750s, human activities, e.g., burning fossil fuel and land use land cover change, have increased the atmospheric concentrations of greenhouse gases (e.g., water vapour, carbon dioxide, methane, nitrous oxides) and thus affected all these cycles. Increase in greenhouse gases has and will continue to increase the mean surface global temperature and enhance the global hydrological cycle resulting in more extreme and heavier precipitation events in many areas with increasing precipitation. Atmospheric concentrations of carbon dioxide have increased by about 30% and methane by about 150%. Nitrogen production due to chemical fertiliser production, has doubled in the 20th century and atmospheric concentrations of nitrous oxide have increased by about 16%. Sulphur dioxide emissions, which have a cooling on the atmosphere and are generally short lived, have increased. In the late 1990s, the anthropogenic sulphur dioxide emissions have decreased due to structural changes in the energy system as well as concerns about local and regional air pollution.

The concentration of CO2 in the atmosphere along with nitrous oxide has acted as a fertiliser and has affected the uptake of carbon by some terrestrial ecosystems (including wetlands). Peat accumulating wetlands are especially important in the carbon cycle because of the large carbon store accumulated in them over millennia. With projected climate changes and the land use land cover change these stores are at risk of being released to the atmosphere. Besides being

carbon sinks, wetlands are sources of methane to the atmosphere. Most wetlands are highly sensitive to hydrological changes especially at the catchment level and thus changes in hydrology (e.g., through drainage, fires, climate change) could lead to further changes in the carbon stores.

What are the key biophysical and socio-economic impacts of climate change on wetlands?

Climate change can directly or indirectly affect many ecosystem functions and thus the goods and services they can provide (see Figure 1). Some of these impacts are:

- a potential for significant disruption of ecosystems affecting many of their functions, e.g. productivity and decomposition
- increasing CO2 concentrations in the atmosphere could increase net primary productivity and net ecosystem productivity in vegetation systems, causing carbon to accumulate in vegetation over time
- increased risk of extinction of vulnerable species for very minimal changes in climate (e.g., 1-3oC additional warming in high latitude/altitude wetlands)
- largest and earliest impacts induced by climate change, particularly where changes in weather-related disturbance regimes and nutrient cycling are primary controls on productivity
- reduced average annual surface water runoff in some areas and increased annual runoff in others would affect many ecosystem functions. In snowmelt dominated watersheds, earlier snowmelt and a smaller proportion of winter precipitation falling as snow is projected to shift peak river flows toward winter from spring and may intensify peak flows thus changing the phenology of many species
- climatic change and other pressures making inland waters that are small and/or downstream from many human activities vulnerable
- peatlands underlain by permafrost could become net carbon sources rather than sinks. With climate warming drainage of tropical peatlands could lead to increased risk of fires and affect the viability of tropical wetlands

A Canadian wetland in Rocky Mountains.
Photo: W. Y. Chiau

Examples of projected changes due to sea level rise and climate change include:

- many coastal systems will experience increased levels of inundation and storm flooding, accelerated coastal erosion, seawater intrusion into fresh groundwater, encroachment of tidal waters into estuaries and river systems, elevated sea surface temperatures and ground temperatures prevailing wave activity and storm waves and surges.
- sea level rise of about a half-meter would inundate significant portions of some small, low lying islands and their coastal ecosystems. Resources critical to island societies and economies such as freshwater, fisheries, coral reefs and atolls, beaches, and wildlife habitat would be adversely impacted
- adverse impacts on coral reefs through increased bleaching and reduced calcification rates due to higher carbon dioxide levels and increased sea water temperatures
- traditional indigenous societies in coastal areas and/or small islands are vulnerable due to their dependence on climate sensitive resources for subsistence hunting and gathering and sometimes low capacity to adapt to changes in the productivity, abundance or geographic distribution of these resources
- a number of marine mammal and bird species may be adversely affected as they are dependent on coastal fish that are sensitive to inter-annual and longer-term variability in oceanographic and climatic parameters
- migratory bird populations that rely on suitable foraging habitat whilst en-route and or those dependent on coastal sites for

nesting may be adversely affected by climate change.

Extreme climatic events have and would continue to have major impacts on wetlands. Examples include:

- projected higher maximum temperatures, more hot days and heat waves could lead to increased heat stress and increased susceptibility to pest and disease attack in many wetland plants and animals
- projected increased summer drying over most mid-latitude continental interiors and associated risk of drought could lead to decreased water resource quantity and quality, physiological stress on animals and plants, decreased wetland productivity in some areas and increased risk of fires.

Impacts of potential changes in wetlands on climate change include:

- in the Arctic, changes in forests/grassland/shrubland/wetland extent and boundaries could enhance projected regional warming
- in areas without surface water (typically semi-arid or arid), evapotranspiration and the albedo affect the local hydrologic cycle and thus a reduction in vegetative cover could lead to reduced precipitation at local/regional scale and change the frequency and persistence of droughts.

Human responses to climate change could further exacerbate the negative impact on many wetlands. For example, human responses to a warmer climate are likely to place greater demands on freshwaters to meet water needs for urban and agricultural use. This could potentially result in decreased flow in rivers and streams and/or decrease in free flowing rivers/streams and greater fluctuations in water level. These changes would cause a loss of ecosystem services and products from some wetlands. Conflicts between developers and those wishing to reduce the development pressure on lakes and streams would likely intensify as freshwater becomes either more scarce or more abundant.

Do these impacts differ between types of wetlands and between regions?

Like any ecosystems, some wetlands can be considered to be resilient to climate change and others more sensitive either because they are near their moisture or temperature tolerance and/or because the species and the function have very narrow temperature and moisture limits. Broadly speaking, wetlands can be classified into those with

- permanent wetlands (e.g., lakes, rivers, reefs),
- broad short-term variability (i.e., high intra-annual variation, e.g. between wet and dry season, or high and low tide) and
- ephemeral wetlands that have high interdecadal or interannual variability (e.g., those in arid and semi-arid parts of the world).

Impacts of climate change would thus vary between these wetland types. In addition, there is an effect of inertia in many wetland ecosystems, e.g. due to the longevity of the species, which means that the impacts may not

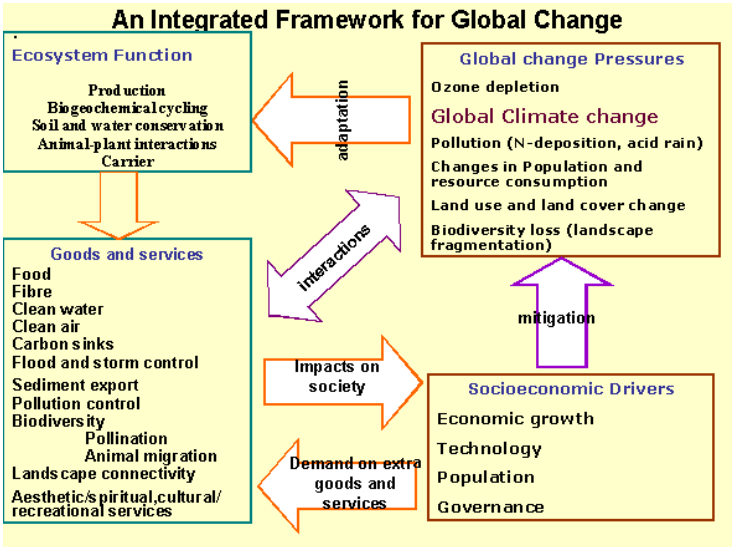


Figure 1: Climate change in the context of global change and the interaction between these changes, their drivers (socio-economic pathways), the ecosystem functions and the goods and services that ecosystems provide. Modified from IPCC (2001c) and Gitay et al (2001)

A hot spring wetland in Nikko National Park, Japan.
Photo: W. Y. Chiau

become apparent over a short time period. Wetlands in high latitude and/or high latitude areas and coral reefs are considered to be amongst those most sensitive to climate change and thus are likely to be impacted earliest. The others that could be impacted by climate change are those in regions that experience El Niño-like phenomena which are projected to increase in intensity and frequency and/or are located in the continental interiors and thus are likely to experience changes in the catchment hydrology. In the near-shore marine and coastal systems, many wetlands could be impacted indirectly as a result of climate change due to changes in storm surges and saltwater intrusion into the freshwater systems.

What is the effect of climate change relative to the other pressures affecting wetlands?

The earth is being subjected to many human induced and natural changes, often referred to as global change. These include pressures from increased demand for resources, increase in human consumption patterns leading to land-use and land-cover change (including urbanisation), accelerated rate of anthropogenic nitrogen production/deposition and other air pollutants, accelerated rate of biodiversity loss and climate change (see Figure 1). The impacts of these pressures often lead to increased demand for access to land, water and wildlife resources. The result is a change in the state of the earth's land surface and in the landscapes where humans live and the goods and services humans receive from the ecosystems, at regional and global scales. The impacts of climate change include changes in atmospheric composition of greenhouse gases (e.g., water vapour, carbon dioxide, and nitrous oxides), temperature, precipitation and sea level rise. These can then affect disturbance regimes, such as frequencies of fires and outbreaks of pest/diseases.

Over the next two or three decades, the land use land cover change resulting in drainage and clearance of wetlands, changes in their hydrology, are likely to dominate the changes due to projected climate change. However, the changes listed above interact with each other and affect the ecosystem functions (e.g., primary and secondary production, decomposition etc). For wetlands in particular, climate change is an added stress that would affect the hydrological regime, the biodiversity and thus many of the functions and thus the goods and services provided by these ecosystems. Climate change on its own and/or in combination with the other pressures is thus likely to become more important especially if the greenhouse gas emissions and thus the temperature projections are at the higher end of the Intergovernmental Panel on Climate Change assessments over the 2030 onwards time frames.

What options exist to adapt to climate change and which of these options complement or conflict with Ramsar's Guidelines for the wise use of wetlands?

Adaptation in IPCC is taken to be a human intervention with the intent of lessening the effects of climate change and not the autonomous response of the ecosystems (e.g., increased net primary productivity in many species due to the increased levels of atmospheric concentrations on carbon dioxide). Adaptation options can thus be dependent on institutional capacity and infrastructure in the region or country. In general, the potential for adaptation is more limited for developing countries, which are also projected to be the more adversely affected by climate change. Adaptation appears to be easier if the climate changes are modest and/or gradual rather than large and/or abrupt. Many of the adaptation options can not only address climate change impacts but could provide "win-win" option for other problems, e.g. wetland degradation..

Adaptation options should be considered in the sustainable development framework and thus are not likely to conflict with the wise use of wetlands. However, given the inertia in some wetland species and function, developing adaptation options would have to take these into account. In addition, there is also likely to be institutional inertia, e.g. implementation of management plans may be in a 10-year cycle, and thus these could affect the planning and implementation of adaptation options. Monitoring of adaptation options should be considered to be an essential feature so that the overall adaptive framework that is responsive to the changes being observed either as a result of the adaptation measures or some other factors can be modified.

Most of the wetland processes are dependent on the catchment level hydrology. Thus, adaptations for the projected climate change may be practically impossible or very limited. Potential adaptation options are also limited due to the geomorphology of the system so that the evolutionary time frame the dynamics of the system can limit some options.

For example, a coastal low-lying wetland system that is relatively young and has dynamic substrate and channelling system has fewer adaptation options than an older and more stable system.

Nevertheless there are a number of potential adaptation options that can contribute to the conservation and sustainable use of wetlands. Examples include:

- designing multiple-use reserves and protected area which incorporate corridors that would allow for migration or organism as a response to climate change. The response of some wetland species (both animals and plants) to climate change could be a range expansion or poleward movement of the species. Some of these may be invasive species (both native and exotics) and could impact on the system especially through changes in the hydrology. Adaptation option in this case would have to include truncation of potential corridors or control of invasive species to limit the expansion of more competitive native or exotic species especially into wetlands that may be small and have high endemism.

- expanding aquaculture to relieve stress on natural fisheries

- specific management in some ecosystems could reduce pressures on wetlands, e.g., in the wetlands in the Arctic, economic diversification could reduce the pressure on wildlife, rotational and decreased use of marginal wetlands especially in semi-arid areas could reduce wetland and wetland biodiversity loss

- integrated land, water and marine area management with the aim of reducing non-climate stresses could be beneficial to wetlands, e.g., reduction of fragmentation of water systems, reduction of land-based pollution into marine systems such as coral reefs

- others that could benefit wetlands include: efficient use of natural resources and restoration of degraded wetlands.

There are likely to be negative repercussions of specific adaptation options. Examples include:

- active transportation of aquatic species or "better-adapted" warm water species poleward which from historical evidence would suggest could result in the extinction of local wetland species and large changes in ecosystem processes and structure all with economic consequences

- interactions resulting from increased stocking and relocation of recreational and aquaculture endeavours

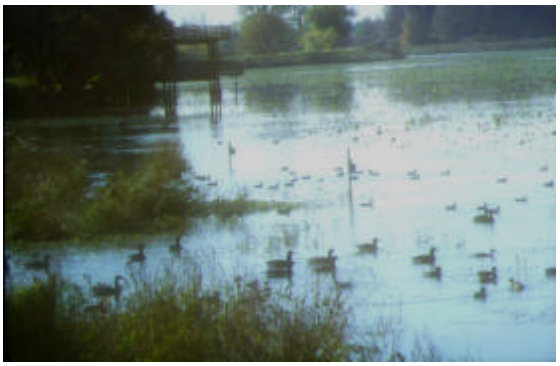
- other negative effects related to secondary pressures from new hydrologic engineering structures.

Are there some ecosystem types that could be considered to be particularly vulnerable?

Human and natural systems are defined to be vulnerable to climate change either because they have few or no adaptation options to reduce the impacts of climate change and/or they are naturally sensitive to climate change (for example due to their geographic or socio-political location). Due to limited or lack of adaptation options for wetlands and or the sensitivity to climate change, some wetlands can be considered to be vulnerable to climate change.

High latitude and high altitude wetlands, e.g. in the Arctic and sub-arctic ombotrophic bog communities, alpine streams and lakes, coral reefs, coastal freshwater wetlands and freshwater lenses that are susceptible to salt water intrusion are considered to be vulnerable to climate change. Wetlands that are affected by one or more of the pressures of global change (see figure 1) and/or introduction or invasion by exotic species are also considered to be vulnerable to climate change. Potential changes in quantity and quality of water reduce the ability of these wetlands to provide and continue to provide many of the goods and services.

What options exist to use wetlands



Tinican Environmental Education Center, Philadelphia, USA.
Photo: W. Y. Chiau

in mitigating greenhouse gas emissions and which of these complement or conflict with Ramsar guidelines on the wise use of wetlands?

Human activities, e.g. fossil fuel use, land use land cover change, have resulted in increase in the amounts of carbon being added to the atmosphere. About 28% of the carbon since the 18th century has been retained in the atmosphere and the remainder is estimated to have been taken up, in approximately equal amounts, by oceans and the terrestrial ecosystems. Between 1980 and 1998, the terrestrial ecosystems have been a small net sink for carbon dioxide probably as a result of land use practices and natural regrowth, the indirect effects of human activities, including the CO2 fertilisation effect and nitrogen deposition and possibly changing climate. Projections suggest that the additional terrestrial uptake of atmospheric CO2 on a global scale may continue for a number of decades but may then gradually diminish and could even become a source by the end of the 21st century. This conclusion does not consider the effect of future land use and land cover change or actions to enhance the terrestrial carbon sinks. In particular the Kyoto Protocol and the Bonn Accord allows carbon credits for afforestation, reforestation and avoided deforestation activities. Both of these are likely to affect wetlands as afforestation could allow forested wetlands on land that has been without forest cover for a period if time (eg. 20 to 50 years) and reforestation - the conversion of non-forested land to forest land, with the land being under a different land use over historical times. However, these actions may be minimal for forested wetlands. Nevertheless, these actions can have benefits to the wetlands but can also pose risks. Consistency with national and/or international sustainable

Upo Wetland, a Ramsar site in Pusan, Korea.
Photo: W. Y. Chiau

development goals could reduce the risk of the negative impacts. Impacts include:

reforestation or afforestation activity benefits could include an increase in the diversity of flora and fauna, except in cases where biologically diverse non-forested ecosystems (e.g., grasslands) are replaced by forests consisting of single or few species. These negative impacts could be minimised by measures that lengthen rotations, maintain understory vegetation, use native tree species and minimise chemical inputs. Afforestation can have varied impacts on ecosystem functions, such as water run-off and nutrient cycling.

- avoiding deforestation can provide potentially large co-benefits, including conservation of biodiversity, soil resources and maintenance of non-timber forest products.
- increasing tree cover or protecting it from being decreased can improve and protect soil quality in areas that are vulnerable, e.g. stabilise watershed flows thus potentially indirectly benefit wetland fucntions.
- One of the major sources of greenhouse gases is from peatland dominated wetlands (as methane and CO2). Actions that would avoid degradation of these wetlands and thus the potential release of the greenhouse gases would be an beneficial mitigation option.

What are the robust conclusions and key uncertainties?

There is still lack of detailed information about the distribution, extent and use of wetlands which makes it difficult to predict the impacts of climate change. Lack of consistent classification exacerbates the problem. In addition, changes in wetlands are dominated by changes in catchment hydrology.

Climate change has already affected some wetlands (e.g. Arctic wetlands, coral reefs) and will continue to do so. Lack of regional specific wetland data, regional climate change scenarios let alone catchment level climate change scenarios, makes it difficult to predict that the impacts of climate change on many wetlands.

Many pressures (e.g., land use change, pollution, extraction of water for urban or agricultural use) act on the wetlands simultaneously, but may be with different time lags (eg. the run-of changes due to deforestation can be slow compared with those due to local temperature changes due to changes in the frequency and intensity of El Niño-like phenomena). These add to the problems of looking at the impacts but also the adaptation options. Increase in the additional pressures due to human activity (e.g., drainage of wetlands or changes in their uses, including introduction of exotic species for recreational

purposes) is likely to increase the impacts and limit the adaptation options. The overall adaptation options would be to minimise changes in hydrological regimes. Adaptation is no longer an option; it is a necessity, given that climate change-related impacts are already occurring. Adaptation options will vary with location and wetland types but have the potential to reduce many of the adverse impacts of climate change and to enhance beneficial impacts. The capacity of different regions to adapt to climate change depends highly upon their current and future states of socio-economic development and their exposure to climate stress. Therefore the potential for adaptation is more limited for developing countries, which are projected to be the most adversely affected. Adaptation appears to be easier if the climate changes are modest and/or gradual rather than large and/or abrupt.

A major component of adaptation that needs further attention is assessment of the vulnerability of wetlands to climate change and sea level rise. Many wetlands are vulnerable to climate change either due to their sensitivity to changes in moisture and temperature regimes and or due to the other pressures from human activities and limited or lack of adaptation options. Future management for these wetlands would have to take the multiple pressures and the added stress of climate change into account. Monitoring program to look at the effectiveness of these adaptation or management options and steps to rectify any adverse effects should be part of the adaptive management strategy.

There is a danger of implementing adaptation options that have local or short term benefits (e.g., fish stock for recreational fishing in a warming lake, infrastructure development to control floods) but could result in longer term negative consequences (e.g., extinction of local species and thus loss in local biodiversity and more damage from a large flood as there was limited route for water to flow).

Some uncertainties arise from a lack of data and a lack of understanding of key processes and from disagreement about what is known or even knowable. Other uncertainties are associated with predicting social and personal behaviour in response to information and events. The uncertainties tend to escalate with the complexity of the problem (eg. changes due to the multiple pressures), but also due to elements being introduced to include a more comprehensive range of physical, technical, social, and political impacts and policy responses.

The uncertainties can never be fully resolved, but often they can be bounded by more evidence and understanding, particularly in the search for consistent outcomes or robust conclusions.

Our understanding of wetland hydrology, its effects on chemical and biological functions is very limited and thus is a key uncertainty to the predicting any impacts due to any of the single and or multiple pressures due to human activities and developing adaptation options. The feedbacks, lag times and the inertia in the response of wetlands and their functions adds to the uncertainties. Many of the wetlands require detailed local knowledge both in terms of understanding the processes, the distribution of the wetlands, their uses and the past and present management. This in many regions is lacking or very limited. Thus it is hard to project the impacts of climate change for many regions beyond a generic level, let alone suggest adaptation options.
For more information:
http://www.ramsar.org/cop8_doc_15_e.htm

Lake view in Rocky Mountains, Canada.
Photo: w. Y. Chiau

Cultural aspects of wetlands

(A portion of COP8-DOC.18)

The 8th Meeting of the Conference of the Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971)

Valencia, Spain, 18-26 November 2002

Black-faced Spoon Bill at Chigu Lagoon, Taiwan.
Photo provided by Wetlands Taiwan

Without entering into the discussion of the exact definition of culture and the nature of cultural values, it seems evident that in the case of wetlands, these values emerge from a variety of elements, tangible or intangible, material or spiritual, ancient or contemporary. These can be identified, experienced and appreciated in many different ways, singly, combined or in an integrated manner. To view them separately is sometimes useful in analysing and describing them. However, they are all bound together by wetland space and are integral parts of it. In addition, many of them retain links to one another. Thus an inventory of the most significant cultural values of wetlands might include the ten categories listed below (which could be grouped in various other ways).

Paleontological and archaeological records in wetland water and sediments and especially peat. This category could be extended to include archaeological findings in the immediate vicinity of wetlands or in clear relation to them.

Box 6: Research in French rivers and lakes

With the encouragement of the General Direction of Cultural Affairs, Ministry of Culture, through its Regional Services of Archaeology, and with the active participation of academic institutions, careful excavations and research have been carried out during the 1990s in the rivers and lakes of France and the neighbouring areas of Switzerland. The results have been registered in a wide variety of publications.

Cultural landscapes and agro- and other production ecosystems, as transformed by human action related to traditional primary production activities. This would include ricefields (flat or terraced), salinas, lagoons or estuaries exploited for fisheries, and other similar areas.

Box 7: Landscape poetry: the ricefields in Nepal and other Asian countries

Since the birth of agriculture, human primary sector activities have modelled the land on the basis of production needs and at the expense of immense labour. In traditional societies, the results were often landscapes of great beauty, in complete harmony with nature.

A case of exceptional beauty is the ricefields in Nepal. Formed through centuries of human toil in a steeply sloping land, the paddies follow the contours and trace their sinuous lines along hills and valleys. When flooded with water, their silvery surface produces miracles of reflection on the land, as one travels on the narrow and winding road from Kathmandu to Butwal. In parallel, and besides the production of rice, the ricefields provide important services in managing water flow, minimising erosion, and contributing to biodiversity. Similar landscapes are found in many other parts of Asia, such as in Binong on the island of Java and the Philippine Cordilleras.

Historical structures in or related to wetlands, including buildings and settlements, hydraulic works, water mills, transport systems (such as jetties, roads, and bridges).

Box 8: The water wheels of Hamah in Syria

To raise water from the lower part of the town of Hamah to its higher neighbourhoods, an ingenuous system was devised many centuries ago. A number of immense water wheels have been constructed, with diameters approaching twenty metres. Placed on the river that crosses the town, they are turned by its flow, thus lifting the water to the higher level.

The wheels are made of large pieces of wood, cleverly connected to give them stability and strength. They do not have symmetrical and concentric spokes, but the cross pieces are placed off centre, thus relieving the axle from direct stresses. Their construction and maintenance is the task of specialised workmen that inherit the knowledge from generation to generation.

Besides their utilitarian purpose, the water wheels create an imposing landmark in the heart of the town and have become an important tourist attraction. Unfortunately, due to the drought of the last years, water flow in the river has dwindled, and now only one wheel is still in operation, just for the visitors. It is feared that, if the situation continues, the techniques and cultural values associated with them will be lost.

Artefacts, and in particular transport equipment (such as boats and carts) and tools used in traditional activities related to wetland resources.

Box 9: Traditional wooden boats as cultural artefacts

Boats made out of wood are a common and distinctive feature of practically all wetlands. Used mainly for fishing and transportation, they have existed since Neolithic times. Although no systematic study has been done on them, there are certain general features that can be pointed out.

· Wetland boats and the methods of their construction have changed very little during the past three millennia. As a result, their characteristic forms have remained practically unchanged, and have evolved slowly and slightly.

· Wood has been the most commonly used material, although there have been cases of reed and papyrus use (such as in India, Mesopotamia, and the Andean lakes). Contemporary materials, and especially reinforced artificial resins, have been introduced, but have been in use mainly in the developed world, due to their high cost.

· Invariably, they are flat-bottomed and keel-less so that they can go into very shallow waters. Their sides are often elevated for functional reasons, in particular to increase their carrying capacity.

· Oars or poles have been the main method of locomotion, which is slow, but silent and inexpensive. The introduction of internal combustion engines changed considerably the conditions of exploitation of wetlands, although their initial and operational costs are high.

· On the aesthetic side, traditional wetland boats are often of great beauty, as they combine austere functionality with a sleek elegance.

Past and present **collective water and land use management**

systems (such as irrigation, water distribution and drainage associations, and traditional dispute settlement practices).

Box 10: Sustainable water management in India [note 4]

In most parts of India, the perennial water cycle of drought and floods determines the life of inhabitants. Through the years, very sophisticated methods for using water effectively and economically have been developed and applied by local societies, in a decentralised manner, helping to create stable local governance institutions. Tank irrigation systems are one of these methods. In the State of Tamil Nadu, there are today 39,202 tanks, some of them very ancient, which account for 22.9% of consumption. However, this share is decreasing, due to encroachment, urbanization, siltation and neglect. Efforts are being made to improve their rehabilitation, maintenance and use. Water harvesting is also a traditional approach in a climate of social solidarity. To promote it, water pilgrimages (*paani yatras*) are being organized this year in Chennai and Pondicherry. Their aim is to highlight participatory, efficient, sustainable and low-cost water management methods, interacting with the responsible organizations and communities.

Box 11: Traditional and modern water management in Ecuador [note 5]

In the Ecuadorian part of the Andes, a large percentage of the irrigated land (320,000 of 400,000 hectares) has been managed traditionally through ancient community-based systems. In the '70s and '80s, however, the State intervened and started imposing a centralised management of water resources, through the *Instituto ecuatoriano de recursos hidráulicos*, which attempted to modernise the traditional water rights system. After 30 years of 'hydrological bureaucracy', the results were inter-community conflicts, split concessions, and ineffective operation.

To correct the situation, recent governments have attempted to apply a new, liberal approach, through a water privatization scheme (proposed by the World Bank and first applied in Chile). The political and economic crisis in Ecuador during the 1990s has

not facilitated the implementation of the new system, which has been vigorously contested from many sides. At present, local communities are facing the problems of fragmented and inefficient water management and an endless series of conflicts over water rights, having lost their traditional wisdom, cohesion and mechanisms, without interest and investments from the markets and with minimal state advice and support. Yet all three sides must cooperate to find a common, satisfactory *modus operandi*.

Box 12: Water management in the Arab world

Following faithfully the teaching of the Qur'an, and inhabiting essentially arid regions, the Arab people devised a comprehensive and wise approach to water management which had profound impacts in many parts of the world as the Islamic religion spread. Some of the main ones are the following:

The concept of *al-hima* is an obligation to establish reserve areas for the public good, which would be required for the conservation and wise management of rangelands and pastures, forest and woodlands, watershed and wildlife. The importance of these reserves for the conservation of wetlands and water resources cannot be underestimated.

The equitable management, however, of water resources made necessary the existence of social mechanisms for resolving disputes. Thus water tribunals were established, which met in public and heard complaints, before passing judgment. This efficient system was transmitted from the Moors to the Spaniards and are still in existence, for example in the city of Valencia, Spain.

On the technical level, many Arab cities (such as Fez and Marrakech in Morocco) had very complex networks for water distribution. These necessitated specialised expertise in construction and maintenance, which was provided by skilled workmen organized in guilds, with their own traditions and culture. Recently, efforts are being made to re-establish both the skills lost and the corresponding forms of social organization.

Traditional techniques for exploiting wetland resources (salt, rice, fish, reeds etc.) and their associated products and structures. Some of them may be still in practice, while others already abandoned.

Languages, customary law systems, political structures, roles and customs, including oral traditions, as they exist in the memories of local inhabitants or have perhaps been recorded in the past and can be found in appropriate bibliographic sources.

Traditional knowledge, including traditional medicine and ethnobotany. Such knowledge is practiced today in many places. In others it is at risk or has already been lost, due to many factors.

Box 13: Traditional knowledge and WIPO

The World Intellectual Property Organization (WIPO) considers that traditional creativity and cultural expressions are important for cultural identity, as well as for preserving and promoting cultural diversity and human creativity. These they recognise if four categories:

- verbal expressions (such as stories, poetry and languages);
- musical expressions (such as songs and music);
- expressions by action (such as dances, plays and rituals); and
- tangible expressions (such as paintings, sculptures, pottery, woodwork, jewellery, basket weaving, textiles, carpets, musical instruments, and handicrafts).

All of these are treated within the overall concept of 'traditional knowledge'.

WIPO, at the request of its members, has started studying the protection of traditional knowledge and folklore through the recognition and role of related intellectual property rights. In a first phase (1998-1999), WIPO has analysed the issues relate to traditional knowledge and property rights, and in a second phase (2000-2001) has proceeded in carrying out pilot work in selected cases.

Currently, this effort continues through the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, which was established by the WIPO Member States in 2000.

It is evident that in the present competitive global context, the recognition of intellectual property rights to traditional knowledge, if done in an equitable and sensitive manner, may contribute to its preservation.

One of the most interesting results of WIPO efforts is the recognition that protection of cultural knowledge may also depend upon safeguarding of the resources, spaces, and other aspects of the social and natural context necessary to promote and sustain traditional creativity."

Mythology, beliefs and religious aspects, including sacred sites and ritual ceremonies. As water is

one of the critical elements for sustaining life, it is natural that it has given rise to a multitude of beliefs. Thus, from mythology and the religious beliefs of indigenous societies to the contemporary teachings of the major churches, one common thread is reverence for water. On a broader level, many of the churches have become sensitive in recent years to nature conservation and the sustainable use of its resources, as stewardship of the Creation and veneration of the Creator, and have restudied their traditional texts from this perspective.

The arts that have drawn inspiration from wetlands and water include mainly:

- many expressions of popular art, such as "naï ve" and other forms of painting, including engravings on rocks, sculptures, carvings and handcrafts in general, as well as music, dance, poetry, etc., and including traditional festivals in many parts of the word;
- literature, such as Swift G. (1983), *Waterland*, William Heinemann Ltd, London, UK, pp. 310.;
- painting and sculpture, such as the landscapes of Joseph Mallord William Turner (1775-1851) and John Constable (1776-1837) and the work of Chinese and Japanese artists for many centuries;
- music and dance (see table below); and
- cinema and theatre, such as "Rizzo amaro" (Italy) and the "African Queen" (Lake Victoria).

Naturally, there are great differences from society to society, but generally water and wetlands have provided inspiration for many of the art forms

For more information: http://www.ramsar.org/cop8_doc_15_e.htm

Box 14: The sacred nature of water

In most religions, water is considered a sacred element of great importance. As the Qur'an states: "We made from water every living thing" [note 6]. Some other examples of the religious use of water:
- The sacred bathing in the Ganges.
- The sacrament of baptism in Christianity.
- Ablutions before prayer in Islam.
- The blessing of the waters in many religions.

Table 1: Characteristic classical music works related to wetlands and/or water

Composer	Period	Title
Handel, Georg Friedrich	1685-1759	Water Music Suite
Respighi, Ottorino	1879-1936	Fontane di Roma (Fountains of Rome) Gli Ucelli (The Birds)
Schubert, Franz Peter	1797-1828	Trout Quintet
Smetana, Bedrich	1824-1884	Vlatava
Tchaikovski, Peter Ilyich	1840-1893	Swan Lake
Telemann, Georg Philipp	1681-1767	Hamburg Ebb and Flood

Box 15: Japanese water music

[note 7]

"On September 4 (2001), we organized 'The Japan Water Sound Night' at the site of the opening ceremony. The event attracted a capacity audience. The performance of melodies on a water theme, played by *shakuhachi* (bamboo flute), *koto* (Japanese harp) and *kozutsumi* (Japanese hand drum), received a standing ovation at the end. Through this concert, I recognized the characteristics of both the universal as well as the local features in common of 'water and music'." Hideacu Toda

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