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Sustainability of Basin Organisations: the Politics of Hydrological Data.

Bastien Affeltranger, Ph.D.
Associate Researcher, IQHEI Institute (Quebec, Canada)
E-Mail address: b.affeltranger@hotmail.com

Frédéric Lasserre, PhD
Professor, Geography Department, Laval university
Frederic.lasserre@ggr.ulaval.ca

Abstract

Although hydrological data are critical to successful *Integrated Water Resources Management* (IWRM), many obstacles limit information exchange. On transboundary river basins for instance, availability of water-related information has a direct influence on the performance of River Basin Organizations (RBOs). Ph.D. research on the Mekong basin shows that intergovernmental agreements are no guarantee for smooth exchange of hydrological data. Rather, bureaucracies in riparian countries often have a limited capacity to contribute to the circulation of water-related information. Limitations include technical, organisational, financial and political features. All crystallise into the *politics* of hydrological data and emerge as a useful analytical approach to hydropolitical situations.

Introduction

Although hydrological data are critical to successful *Integrated Water Resources Management* (IWRM), many obstacles limit information exchange. On transboundary river basins for instance, availability of water-related information has a direct influence on the performance of River Basin Organizations (RBOs). Geopolitical research on the Mekong basin shows that intergovernmental agreements are no guarantee for smooth exchange of hydrological data. Rather, bureaucracies in riparian countries often have a limited capacity to contribute to the circulation of water-related information. Limitations include technical, organisational, financial and political features. All crystallise into the *politics* of hydrological data that emerges as a useful analytical approach to hydropolitical situations.

The *politics* of hydrological data emerges from two converging trends on transboundary basins: first, the institutional dynamics of water resources governance; second, the informational dynamics of hydrological knowledge generation. Success of environmental regimes and RBOs on transboundary basins depends on how the *politics* of hydrological data is considered by stakeholders in water resource management.

Based on research results from a Ph.D. in Geography (2003-2007), this paper is organised as follows. First, information management is introduced as a challenge to

IWRM. Second, exchange of hydrological data is presented as a condition to sustainable river basin organisations. Third, a Mekong case study illustrates these concepts. Results focus on the capacity of water bureaucracies in Mekong countries to engage in hydrological co-operation. Influence on the Mekong River Commission (MRC) is discussed.

IWRM and environmental information

Water resource management: an information gap?

Availability and accuracy of hydrological data contribute to sound decision-making in water resource management. This is for instance the case when assessing or forecasting the state of the resource. Water managers missing such data run the risk of developing misperceptions or biased representations when assessing the resource availability. Information is also needed to understand societal patterns of water use and pricing patterns (if any). Missing information may lead to inefficient or unfair allocation among users – an acknowledged source of social tensions and to inaccurate forecasting of the balance between supply and demand. Water-related information is needed, as it carries a description of the natural and social environment.

However, information management considered as a social construct has been given little attention by scholars in IWRM and sustainable development. This is quite surprising, as circulation of hydrological data is often discussed in intergovernmental agreements on shared river basins¹. While development of hydrological knowledge has been identified as a vehicle for trust-building on shared resources, lack of information exchange is an obstacle to successful water governance². Research is also needed because of the globally increasing volume of *virtually unprocessed* environmental data. Developments in environmental informatics and remote sensing, for instance, coexist with a growing gap in terms of data processing capacities. This is a matter of concern, as stakeholders in natural resources management are increasingly seeking information in order to scrutinize decisions made, or to make their own.

The international community has acknowledged the role of information exchange in governing transboundary river basins. This is for instance the case with Article 9 of the 1997 *United Nations Convention on the Law of the Non-navigational Uses of International Water Courses*³. Intergovernmental agreements advocate for open exchange of environmental information: *United Nations Principles on Remote Sensing* (1986); *Framework Convention on Climate Change* (1992); statement from the *International Oceanographic Commission* (1993) etc. Technical programmes advocate the same way: *Flow Regimes from International Experimental and Network Data* (FRIEND⁴) project (started 1985); *World Hydrological Cycle Observing System* (WHYCOS⁵) initiative (launched 1995) etc.

However, technical and political obstacles limit the implementation of the above agreements. This is for instance the case with the *Aarhus Convention* (1998)⁶. Although the Convention advocates for public access to environmental information as a condition to social justice, few States have signed or endorsed this text. Authorities usually remain reluctant to make environmental decision-making more transparent⁷. Market-oriented or business considerations may also act as limiting factors. For example, the World Meteorological Organisation (WMO) discourse on meteorological data exchange has evolved towards a less ambitious policy : the 1995 WMO Congress resolution revised

this policy by providing a two-tiered data exchange system. Dissemination and pricing patterns would now be established depending on data categories and data utilization purposes.

Obstacles to the circulation of environmental information

Obstacles to the unrestricted access to, and circulation of environmental information feature various dimensions: technical, organisational, economical, political and ethical:

- ✓ *Technical obstacles.* As observed in 2001 by William Cosgrove, a past president of the *World Water Council*, the volume of collected hydrological data is globally decreasing⁸. Existing hydrometric networks worldwide suffer from a chronic lack of investment. This is particularly the case in developing countries, where limited public budget impacts on data collection and maintenance capacities. Civil or military conflicts also impact existing networks.
- ✓ *Organisational obstacles.* A global WMO study has identified several organisational weaknesses in National Hydrological Services (NHSs). These include: limited budget; lack of skilled staff; low salaries etc. In addition, competition among staff and organisations for data is witnessed in instable institutions – such as those undergoing reforms of the State apparatus⁹.
- ✓ *Economical obstacles.* Raw (unprocessed) hydrological data have been increasingly considered as resources for developing information-based products and services with market value¹⁰, such as client-specific weather forecasts and warning services¹¹. In industrialised countries, tensions and conflicts have arisen from the privatization of these data: the marketing potential (business opportunity) is a strong incentive for individuals, agencies and governments to restrict access to environmental data¹².
- ✓ *Political obstacles.* In democracies, (civil) society usually has a legal right to comment environmental decisions (natural resources, energy etc.) made by authorities. In non-democratic countries however, commenting political decisions is a rather dangerous privilege. In both cases, civil society needs accurate information in order to contribute to the debate. However, artificially maintained situations of imperfect information tend to bias the balance of power in environmental controversies, thus the temptation by some actors to retain information as a political tool.
- ✓ *Ethical obstacles.* The circulation of environmental data and information also raises ethical questions. In short: should data collected by public (taxpayer's) money be made available for free to the public (or with a price that corresponds to the marginal cost of data reproduction, printing etc.)? This question is very much connected with the expected role of science and knowledge in social development.

Riparian countries of transboundary basins are usually reluctant to support an unrestricted exchange of environmental information. Obvious geopolitical reasons help explain this conservative strategy. More research is needed, however, to understand the impact of this attitude on the performance of river basin organisations (RBOs).

Assessing the performance of river basin organisations

The institutional dimension has been well identified as a social cause to water scarcity¹³, as well as a condition to the sustainable management of water resources¹⁴. This is also the case on transboundary basins, where the combination of institutional and organisational flexibility¹⁵ is needed for environmental regimes to adapt to changes in the natural, social and political context¹⁶. Assessing the performance of RBOs has now become a distinct issue in the broader field of explaining success and failure in environmental regimes¹⁷.

In that respect, few lines have been written on the unique role played by the management of water-related information as a condition to the institutional sustainability of these regimes. Collection and processing of hydrological data, however, has been clearly identified as a priority function that conditions the emergence and operation of a RBO¹⁸. More: the performance of basin organizations depends very much on the existence of an efficient information management system (IMS) – in particular for environmental and social data¹⁹. Unavailability of information will impact on two sustainability pillars of RBOs: technical *credibility* (of decisions made) and political *legitimacy* (of decision-making). Without accurate information, RBOs cannot be players in water-related controversies.

Mediating environmental debates is an indicator of how successful environmental regimes are on transboundary basins. Establishing sustainable RBOs requires an in-depth investigation of obstacles to the circulation of environmental information.

The politics of hydrological data

Circulation of hydrological data: lessons learned

In February 2000, the Mekong River Commission Secretariat organised an Expert Meeting on flood warning systems²⁰. This event was a privileged moment for a first contact with the technical and political dimensions of hydrological data exchange in the Mekong basin.

This first approach would feature national and inter-national challenges to the sharing or exchange of information. These considerations would be confirmed later by applied research missions for UNESCO's Division of Water Sciences. Missions to Hungary, Mozambique or Botswana were opportunities for exchanging with water managers and foreign affairs authorities on transboundary river basins. As part of a professional contribution to UNESCO's programme *From Potential Conflict to Co-operation Potential – Water for Peace* (PC-CP), ongoing thoughts about the *politics* of hydrological data could mature further. The following considerations could be formulated:

- ✓ *Humanitarian goals and information exchange.* Improvement of flood warning is not always a sufficient incentive for riparian States to increase hydrological data exchange on transboundary basins.
- ✓ *Government discourse vs. administrative capacity.* Although Government discourses tell a lot about countries' readiness to share hydrological data, the response capacity of national bureaucracies is often a matter of concern.
- ✓ *Hydrodiplomacy: signed agreements vs. implementation.* States are often praised for signing inter-governmental agreements on transboundary basins. However a closer attention should be paid to how these agreements materialise.

- ✓ *Data management often taken for granted.* Although legal and institutional features of environmental regimes have motivated much hydropolitical research, the management of hydrological data deserves more attention.
- ✓ *Geographical representations as political instrument.* Stakeholders that have the capacity to influence representations and perception of water resources can gain advantages in situations with imperfect information. Hydropolitical discourses shape hydrological reality.
- ✓ Control of data information enables authorities to influence the construction of geographical representations in environmental controversies, such as water-sharing issues.

The politics of hydrological data

The *politics* of hydrological data emerges from two converging trends on transboundary basins: first, the institutional dynamics of water resources governance, both within the RBO and between member States ; second, the informational dynamics of decision-making and hydrological knowledge generation . This convergence, or nexus, is the symbolic place where geographical representations meet, merge or clash. Different perceptions of water resources, sustained by the interpretation of available data, meet or interact. Different *futures* for the basin converge or collide. The success of environmental regimes and RBOs depends on how the *politics* of hydrological data is considered by stakeholders in water resource management.

Addressing this challenge, however, requires a preliminary reconstruction of the *politics* of hydrological data. In short: why, how and by whom are hydrological data being politicised?

Research context and methodology

Context: the Mekong as hydropolitical crucible

The Mekong river basin offers an excellent case study to analyze issues of environmental governance since multiple interests – technical, economical, social, political – converge and (sometimes) collide. The Mekong appears as a *playground* for riparian countries and extra-regional players – such as international agencies, donor countries or non-governmental organisations (NGOs). All engage in complex interactions, often with vested interests or hidden agendas. The resulting system features the following issues:

- ✓ Access to or control over natural resources (water; forestry; biodiversity);
- ✓ Influence on cultural, economic and political matters;
- ✓ Access to foreign direct investment (FDI) and international support;
- ✓ Access to political visibility at regional and international levels;
- ✓ Control over knowledge generation and development discourses for the basin.

Hydrological co-operation on the Mekong begins in the middle of the 20th century with the formal signing of the Geneva Accords. Since that time, the basin has been host to three major environmental regimes²¹:

- ✓ 1957-1977: *Mekong Committee* (Kingdom of Cambodia; Laos PDR; Kingdom of Thailand; Vietnam SR)
- ✓ 1977-1995: *Interim Mekong Committee* (same countries, yet without Cambodia, then called Democratic Kampuchea)

- ✓ 5 April 1995 – present: *Mekong River Commission (MRC)*²². Same countries as in 1957-1977. PR China and Myanmar participate in the *Dialogue Forum*.

Methodological features

The methodology chosen for this research has been a multi-scalar approach to bureaucracies, institutions and organisations responsible for the collection, management or dissemination of hydrological data and water-related information.

This research has sought to analyse the objectives and motivations of stakeholders in environmental information – with a focus on hydrological data. In particular, resistances and incentives to information-sharing have been studied. Interviews have been organised with individuals or groups, in each country of the Mekong river basin²³.

Considering the final aim of the research – understanding information-related challenges posed to the sustainability of the MRC – interviewees included: staff of National Mekong Committees (NMCs); staff of the MRC Secretariat (including Chief Executive Officer, CEO); partner agencies to the MRC etc. Universities and resource centers have also been contacted, as well as other river basin organisations²⁴. This research has also carefully studied legal documents and technical reports on hydrological data management, throughout Mekong countries.

Research results (I): the value of hydrological data

Early recognition of the hydrological data challenge

Prior to establishing the *Mekong Committee*, the United Nations *Economic Commission for Asia and the Far East (ECAFE)*²⁵, Lower Mekong countries and their partners conducted several technical surveys. In all reports, the lack of hydrological data emerges as a potential obstacle to the development of the basin. Later studies did confirm these observations, advocating for a basin-wide policy on hydrological data.

The so-called Wheeler Report²⁶ (1958) for instance, specifically recommended a five-year program of hydrological investigation, costing US\$9.2 million. Wheeler stressed that priority should be given to data collection, with a focus on promising mainstream sites for water resources development. The rather holistic study conducted by Geography Professor G. White (1963) drew similar conclusions – advocating that social and economic development of the basin would require an appropriate policy on hydrological data²⁷. At the time of these studies however, acquisition of hydrological data or knowledge had no other purpose but planning hydropower and irrigation development. Today's policies on hydrological data serve a broader spectrum of decisions, such as environmental impact assessment (EIA).

Although flood mitigation had been an early objective of intergovernmental co-operation on the Lower Mekong, major floods in 1966 prompted riparian Governments and their partners to consider hydrological data management as a strategic issue in itself. This topic progressively developed into an autonomous activity for the Mekong Committee – establishing dialogue, technical co-operation and information exchange. A first *Strategic Master Scheme for Hydro-Meteorological Network* was drafted in 2001²⁸.

However more than ten years after the birth of the Mekong River Commission, hydrological data management remains a matter of concern on the Mekong basin. Despite obvious achievements of the MRC, most respondents interviewed for this research tend to agree that major obstacles still hinder the exchange of information.

Navigating through political and institutional instability

Access to and quality of hydrological data are still problematic in several countries of the basin. Identified limitations to data exchange feature two categories of obstacles – some *within* national bureaucracies of Mekong countries, such as retention of information; some at the transboundary level, such as Government reluctance to share data. In addition, two context-level elements should be considered, that do influence countries' capacity to engage in hydrological data exchange:

- ✓ *Institutional instability.* Most Mekong countries, if not all, have undergone major changes over the last 20 to 25 years. An example is the transition from central-command to decentralised system, and to privatization and market economy. The role and capacity of the State is being redefined – or even challenged. Water management bureaucracies or agencies are in the frontline of these changes. This has resulted in institutional instability of hydrological administration: organizational changes, power relations and budget allocation criteria. Even performance of civil servants is discussed. In this context, hydrological data appear as an asset or a *resource* to navigate through these rough institutional waters.
- ✓ *Competition over water.* Water is a matter of competition among users in the Mekong basin. Competition depends on the type of use; location of the country; season etc. See for instance the well documented controversy on dams developed in Yunnan and elsewhere for irrigation or hydropower purposes. Authorities in riparian countries therefore consider water-related information as a strategic resource so as to assess the likely impact of these projected dams on their water resource. In short: sharing hydrological opens the door to a more transparent understanding of downstream hydrological impacts caused by upstream water development projects. Hydrological data are like a Pandora's Box, with a potential to fuel additional water claims from downstream countries.

These macro-level features have made riparian States and water institutions reluctant to commit further into hydrological co-operation. Resistances appear both within and among countries. Besides, attitudes of riparian States on transboundary water issues are usually the result of domestic tensions in the water sector, as it is for instance the case in Thailand.

Revisiting the value of hydrological data

As water becomes a strategic resource, so does water-related information – influencing the ontology of hydrological data. In short: the value of hydrological data features technical, organisational, social and political dimensions. We introduce the concept of *total value* of hydrological data, as a social construct mirroring the role played by water resources in riparian countries, economies and State apparatus. A first typology of the *total value* of hydrological data is proposed below:

- *Operational value:* Enabling informed decision-making, better return on investment and reduced negative externalities such as environmental impacts;
- *Economic value*

- *Micro-level*: Data is a resource that can be sold to make up for insufficient budget (organisation level) or salary (individual level).
- *Macro-level*: Selling or dissemination of hydrological data can justify business activity, possibly after preliminary processing of raw data.
- *Organizational value*
 - *Power & status*: Control over data helps civil servants negotiate power and salary deals despite institutional instability. Hydrological data serve as currency in organizational transactions;
 - *Budgetary*: Exclusive access to data gives priority for reporting to authorities and potentially accessing various types of public funding;
- *Hydropolitical value*
 - *Transboundary*: Non-transmission of data helps authorities in upstream countries to conceal downstream impacts of water development projects;
 - *Domestic*: Control over data reduces transparency in environmental decision-making or controversies, thus limiting public scrutiny or claims;
- *Cultural value*: Non dissemination of available data is perceived as a way to avoid blame or loss of face – in particular when quality of data is doubtful.

Research results (II): implications for the Mekong River Commission

The MRC: an asset for the Mekong basin

Establishing an environmental regime on the Mekong basin has always been a challenge to riparian and donor countries, and their partners. It is a fact that this institutional process has mirrored the objectives, views or appetites of these players. Starting operation in 1995, the Mekong River Commission (MRC) has somehow been a catalyst – or a target – of these tensions. In particular, criticism has focused on the alleged limited capacity of the Commission to define and implement a basin-wide policy for the sustainable development of the area. Debated issues included:

- ✓ The MRC Secretariat is too much research-oriented, producing no water resource development infrastructure, but only reports and conferences;
- ✓ The paradigms referred to by the MRC Secretariat are too much driven by sustainable development paradigms, with “green imperialism” from donor countries²⁹;
- ✓ The views, activities or discourse of the MRC Secretariat are perceived by MRC Member States as infringing on countries’ sovereignty over land and resources;
- ✓ Although the Mekong has featured numerous cases of hydropolitical tensions or controversies, the MRC seems to have avoided taking part to these debates;
- ✓ Regardless of its added-value in the past, the MRC is now perceived as an unnecessary obstacle to further development of water resources (e.g.: dams; irrigation).

Mekong countries have however demonstrated a high level of resilience in developing hydrological co-operation ever since the late 1950s. Political turmoil in riparian countries and the influence of the Cold War, could be absorbed in this institutional process. The MRC could also catalyse co-operation with China since 2002 – daily hydrological data from two Yunnan stations sent to the MRC during each flood season. In addition, the annual *Dialogue Forum* initiative has become a place where all Mekong countries can interact – discussing issues not limited to water resources. The MRC Secretariat (MRCS) has progressively evolved into a more mature organization. It now relies on a unique

knowledge base and multidisciplinary expertise – covering a broad spectrum of environmental, technical and social issues. However, difficulties remain that limit co-operation on hydrological data.

Line agencies as last frontier to hydrological co-operation?

Line agencies are services – usually State administrations – in MRC countries that interact with MRCS staff. These services include: water resource management; meteorology; fisheries; agriculture; land-use planning etc. National Mekong Committees (one per country) operate as a hub between line agencies and the MRCS. The present research has demonstrated that improving MRCS contribution to basin management and governance requires a *parallel* improvement of the co-operation capacity in line agencies, both with the MRCS and with their own national institutions and government agencies. Developing this capacity is a condition to the sustainable co-operation process between MRCS and line agencies. Capacity features include:

- ✓ *Financial capacity.* The budget of hydrological or meteorological departments is extremely limited in most Lower Mekong countries. Low salaries often force civil servants to look for complementary sources of income and jobs (e.g.: tourism, taxi driver, teaching etc.). This multitasking pattern reduces actual time in office and degrades professional motivation. Official duties in basin management can be jeopardized. Situations of vested interests also appear.
- ✓ *Human resources.* Technical skills are usually quite low, as well as using English as a professional language. This has a direct impact on transboundary hydrological co-operation. In services or agencies created recently, experience in international co-operation – for instance with the MRC Secretariat – can be limited.
- ✓ *Political capacity.* Ministries actually making water-related decisions in MRC Member States may not be always represented in National Mekong Committees (NMCs). Says a western diplomat: “*depending on ministries and individuals, the readiness to cooperate, and the actual capacity to cooperate, varies a lot among Lower Mekong countries*”. Consequently, NMCs only have a limited capacity to influence water-related policies and projects in their country.

These weaknesses of line agencies in Mekong basin countries have a direct influence on the availability and circulation of hydrological data. Symptoms include:

- *Data are simply not available* in countries. When available, data series may be neither consistent, nor scientifically robust. As a consequence, the MRCS needs to undertake a resource-consuming (both time-wise and money-wise) process of data reconstruction. Property rights for hydrological data has also been a matter of endless discussions between the MRCS and MRC Member States. Only recently did MRC Member States come to a signed agreement – and implementation remains a matter of concern.
- Due to a *lack of public budget or political will*, line agencies in MRC countries often lack resources (staff and financial) for operation and maintenance of hydrometric networks. This can be the case even when networks have been installed with donors’ assistance. This is a major obstacle to data-sharing³⁰.
- *Institutional inconsistency.* High-level agreements for sharing of hydrological data have been signed under the *aegis* of the MRC. In practice however, States as

central authorities do not always have sufficient influence to force their own bureaucracy to implement these agreements. Says an ADB expert: “*the national bureaucratic machineries are not keeping pace with the agreements signed by Mekong governments*”.

Development of parallel, competing knowledge sources

Discussions with MRCS staff and other resource persons in Mekong countries clearly show that the above-described lack of hydrological data has been increasingly compensated by a production of *parallel* water-related knowledge. This process is a social response to the situation of “imperfect information” on environmental issues. In practice, some segments of society develop their own information sources and explanatory patterns to understand their environment – and to act upon it. This kind of empirical knowledge or *heuristics* may be biased by value judgments and, of course, by a lack of proper methodology. Generated knowledge may also be instrumentalized for specific purposes. Says a senior expert in hydraulic modelling: “*some day, these parallel, unconfirmed and ideologically motivated descriptions of the river basin will have become the [single] reference or truth on the state of the Mekong basin*”. Such parallel knowledge even appears as an obstacle to efforts made for developing a hydrological science of the Mekong.

There might be reasons for hope, though. Several Lower Mekong States have increased public budget devoted to hydrological data management. WMO and other international organisations or donor countries have been supporting data-sharing protocols and procedures. Although the implementation of these initiatives has often been difficult, minds and practices are evolving progressively. New practices emerge for disseminating environmental information. New pricing patterns for hydrological data are being progressively introduced. Questions remain, however, on the future role that public administrations should play in the field of environmental information. Tensions have already appeared in most Mekong countries, with pressures from private sector agents asking for a profit-oriented marketization of hydrological data. Such tensions are similar to those already characterising countries in the Western world³¹.

Conclusion: information management and MRC sustainability

The Mekong River Commission has never been the only one catalyst to water-related co-operation on the (Lower) Mekong basin. Despite the successive environmental regimes developed from 1957 to 1995, riparian countries have maintained hydrological co-operation on a bilateral basis. This included water resources management and development, training programmes and information exchange. It also appears that in several occasions, riparian governments have kept the MRC away from major hydro-political controversies. These include: blasting reefs on the Upper Mekong; interbasin water transfers from Mekong tributaries; dam-building etc. The MRC would never be officially involved in these projects – neither as a political facilitator, nor as a provider of technical information for decision-support. “*The MRC seems to be shying away from any transboundary conflict*”, says a western academic.

Despite the tremendous volume of data placed under its responsibility however, the MRC could not become *the* scientific and technical reference for water resource management. Missing such an undiscussed knowledge base jeopardises the sustainability

of the Mekong basin. Absence or low quality of hydrological data have a potential to increase the risk of negative externalities (ecological, technical, economical, social etc.) in water-related decision-making. The MRC case confirms that river basin organisations (RBOs) should play a critical role in providing science-based support to decisions made over water and other natural resources:

- ✓ An efficient basin organisation should be capable of offering an *a-political* knowledge base on water resources, so that Member States and/or basin stakeholders can be well-informed decisions;
- ✓ The institutional capacity of a basin organisation can be measured, at least partly, by the autonomous capacity of this organisation to produce high quality, a-political hydro-meteorological data;
- ✓ A sustainable RBO should be able to perform the following two tasks:
 - Producing water-related knowledge that is relatively free from preconceptions, biased representations or vested interests;
 - Serving as a dialogue forum so that different projects for the basin, and geographical representations, can be discussed;
- ✓ An RBO can be a sustainable institution only if it can establish a hydrological co-operation with line agencies (in Member States or riparian countries) that are sustainable themselves.

Hydrological data are critical to complete RBOs' missions, as they should serve as a reference to make decisions over water resources. The Mekong case has demonstrated that building up such a "shared knowledge base" is not an easy task. The *politics* of hydrological data is both a cause and a consequence of the competition over transboundary water resources.

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²¹ States appear in alphabetical order.

²² In addition, PR China and Myanmar (Birma) and MRC have been holding joint Dialogue Meetings annually since 1996.

²³ Although no meeting could be organized in Myanmar (Birma) with national hydrological services, a technical discussion took place at the Third Mekong Flood Forum (April 2005, Vientiane, Laos PDR).

²⁴ Contacted river basins include: Great Lakes (USA / Canada); Rhine; Danube; Meuse; Jordan; Okavango; Maputo; etc.

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³⁰ This situation has become a major disincentive for many extra-regional donors to the MRC.

³¹ Minster, J.B., Bretherton, F.B., Bromwich, D.H., Carroll, M.A., Donzier, J., Glover, D.M., Leavesley, G.H., McCabe, M.J., et al. 2001. *Resolving Conflicts Arising from the Privatization of Environmental Data*. Committee on Geophysical and Environmental Data. National Research Council. National Academy Press, 99 p.