Managing Asia’s Most Precious Resource

Asia’s water problems are particularly acute. The region is home to 60 percent of the world’s population but has only 36 percent of global water resources. That stark imbalance is sobering. If Asia is to continue to prosper and do so in an atmosphere of peaceful relations among nations, then greater co-operation on water issues will be critical.
The allocation of the Mekong River’s annual flow of 475 billion cubic meters is being contested by those who see the river primarily as a source of hydropower and irrigation against others who believe its natural flow must be preserved to sustain the livelihoods of millions of people.

Through five case studies, David S. Hall and Kanokwan Manorom examine the challenges facing scientists attempting to evaluate the environmental and social impacts of water policy.

The Mekong River, with an annual discharge of 475 billion cubic meters and a floodplain of over 77,000 square kilometers, is the largest in Southeast Asia. Along its course it drops nearly 5,000 meters from its source on the Tibetan Plateau on its 4,800km journey to the delta.

With an average discharge of 14,500 cubic meters per second, there is little wonder that the river has long been viewed as a potential source of hydropower. Fifty years ago, the first plans were drawn up to use the Mekong’s waters for power, with seven large mainstream dams proposed that would have generated over four times the amount of power required at the time for Thailand alone. Until the mid-1990s, when China started work on a cascade of mainstream dams, the river’s hydropower potential, estimated to be some 30,000MW (Mekong River Commission, 2008), remained largely undeveloped. Saved in part by the turbulent history of Southeast Asia, the lower Mekong remains one of the few major rivers in the world that retains much of its natural flow from a complex network of hydraulic works comprising human-made canals, dykes and sluices that provide flood protection, prevent salinity intrusion, and control irrigation (Evers and Benedikter 2009).

However, the region’s newfound political stability, economic liberalization and rapid growth are likely to change this; once again, riparian states are drawing up plans to use the Mekong mainstream as a source of hydropower and increasingly, these plans are being presented as an environmentally-friendly “green” energy solution, especially in the context of climate change. Decisions made in the next few years are likely to have significant and irreversible implications for the flow of the river and for the millions of livelihoods that depend on it.

The economic viability of the dams is underpinned by escalating demand. The electricity needs of Yunnan Province (China) and the other riparian states have been forecast to grow nearly fourfold, from 26,000MW in 2000 to over 102,000MW in 2020, with almost half of this demand coming from Thailand and approximately one third from Vietnam (Norconsult, 2003). In China, the four dams (Manwan, Xiaowan, Nuozhadu and Dachaoshan) that have already been completed form part of a cascade that will exploit an 800m drop over a 750km stretch of river to generate 16,200MW. Enthusiasm for hydropower in China is high, because river flow is seen as a source of “clean” power for eastern China, where dependence on coal-fired power stations has resulted in dangerously high levels of pollution (Dore, 2007).

The Mekong has a highly seasonal flood pulse with dry season flows being as little as 6 percent of the wet season peak (MRC, 2008). However this flow pattern is set to change, as the release of stored water from upstream dams, will increase low season flows, augmenting the viability of run-of-the-river hydropower dams. The combination of increased low-season flows, growing demand, rising energy prices and private sector interest is resulting in something of a “river rush” on the Mekong (Terra, 2007). Now all riparian states have plans to tap into the Mekong and its tributaries, with over 200 new dams, including 11 on the mainstream, being planned (MRC, 2009). However, it is not just power companies who are eying the waters of the Mekong. Large-scale water diversion schemes are also reaching an advanced stage, including a plan to divert 2 billion cubic meters of the Ngum River in Laos to Northeastern Thailand for irrigation via a 17km tunnel under the Mekong.

Those in favor of tapping the Mekong’s hydropower and irrigation potential tend to promote this as a form of “sustainable development,” a term frequently used by the Asian Development Bank (ADB) in the context of its Greater Mekong Sub-Region (GMS) Program. The ADB, in collaboration with the World Bank, argues that the basin’s “flexibility and tolerance” will allow for “sustainable, integrated management and development (that) can lead to wide-spread benefits” (World Bank/ADB, 2006). The mood in the pro-development camp is bullish, with both banks suggesting that there is a need to move from the “more precautionary approach of the past decade” because this tended to avoid risk “at the expense of stifling investments” (World Bank/ADB, 2006).

This unabated enthusiasm suggests that the “hydraulic mission” of the riparian states of the Mekong is not far from being realized. Fulfilling this mission is seen, by many, as paramount to the achievement of national goals and is, therefore, not just a matter of poverty reduction but of “national security.” Those seeking to further their nation’s hydraulic mission see ample opportunity for new infrastructure, and are convinced that any negative impacts associated with reduced river flows can easily be managed.

The alternative view

Enthusiasm for large-scale infrastructure is far from universal, with the opposition ranging from those in favor of tapping the Mekong’s hydropower and irrigation potential tend to promote this as a form of “sustainable development,” a term frequently used by the Asian Development Bank (ADB) in the context of its Greater Mekong Sub-Region (GMS) Program. The ADB, in collaboration with the World Bank, argues that the basin’s “flexibility and tolerance” will allow for “sustainable, integrated management and development (that) can lead to wide-spread benefits” (World Bank/ADB, 2006). The mood in the pro-development camp is bullish, with both banks suggesting that there is a need to move from the “more precautionary approach of the past decade” because this tended to avoid risk “at the expense of stifling investments” (World Bank/ADB, 2006).

This unabated enthusiasm suggests that the “hydraulic mission” of the riparian states of the Mekong is not far from being realized. Fulfilling this mission is seen, by many, as paramount to the achievement of national goals and is, therefore, not just a matter of poverty reduction but of “national security.” Those seeking to further their nation’s hydraulic mission see ample opportunity for new infrastructure, and are convinced that any negative impacts associated with reduced river flows can easily be managed.
the maintenance of natural river flows is seen as vital to the basin’s ecosystem in general, its fisher-
ies in particular, and the myriad river “goods and
services” maintained by the annual flood pulse.
The argument of those opposed to large dams
on the Mekong rests on a number of key points,
one of which is the river’s hydrology. The Inter-
national Rivers Network argues that the pro-
development camp — and in particular the ADB
and the World Bank — is misrepresenting the
Mekong’s hydrology. They accuse the banks of
“massive oversimplification” and of ignoring the
range of flows in the dry and wet seasons. Inter-
national Rivers claims that the banks completely
ignore the changes that will occur in river ecol-
yogy as a result of changes in sediment, flood
pulse, flood plain inundation, water quality and
blockages to fish migration.
A second key point of contention is that of river
ownership. While the pro-development camp
focuses on national or regional level benefits, the
anti-development camp is largely concerned about
the impacts on local people, especially on those
who make the greatest use of aquatic resources to
sustain their livelihoods. The latter see the ripar-
ian residents and resource users as the true own-
ers of the river, not the national governments or
river basin organizations. They believe that the
fundamental decisions about the Mekong’s future
should be made by those who will be most directly
impacted, rather than by the beneficiaries of
hydropower or large irrigation schemes, who are
likely to live many miles away. The two positions
represent a clash of perceived rights: the right of
governments to pursue national developments for
the “greater good” and the right of local com-
nunities to sustain their livelihoods on common
resources used for generations.
A third critical difference has to do with the
effectiveness of mitigation and compensation
measures. While the pro-development camp
Once again, riparian states are drawing up plans
to use the Mekong mainstream as a source of
hydropower ... Decisions made in the next few
years are likely to have significant and irreversible
implications for the flow of the river and for the millions of livelihoods that depend on it.
tends to present an optimistic (although vague)
view of the effectiveness of such measures, their
opponents note that there is very little evidence
of impacted households ever being able to fully
recover — let alone improve — their standards
of living. The key failures noted in compensation
plans are that they are overly ambitious, inade-
quately appraised, inappropriate to local needs
and based on unjustified assumptions about new
technologies, such as fish ladders to facilitate
migration and rabbit farming to replace lost pro-
tein (Blake, 2005).
A fourth and very fundamental difference has
to do with public participation and community
consultation. Those opposed to dams generally
claim that the developers make major decisions
on the basis of very limited involvement from
impacted people, with most workshops being held
late in the process and far from the people most
likely to suffer. They further accuse developers of
extracting information from local people rather
than truly involving them in decision-making.

THE UNCERTAIN ROLE OF
SCIENCE AND POLICY
Within this contested context, natural and social
scientists are under pressure to generate results
and literature which can — at least ostensibly —
be used to guide decision-making on future river
flows. Problems in many scientific and techni-
cal professions usually arise during the process
of informing policy deliberations (Rykiel, 2001).
The provision of accurate, relevant, policy-neu-
tral information is seldom accepted, especially in
a complex and controversial situation. The use of
science to justify a particular stance in a range of
competing political agendas typically brings out
either intrinsically uncertain or diverse scientific
information (Pietke, 2004). Hence, science and
policy have different logic behind their opera-
tions (Lange and Garrels, 2007) and scientists
are wary of misinterpretation or the misuse of
science in policy deliberations (Karr, 2006).
Research on the impact of dams and other built
structures on flow is being carried out across the
Mekong Basin, but in vastly different contexts. It
ranges from strategic assessments of the cumula-
tive impacts of changed flow-ranges, using basin-
wide models and predictive tools (Sarkkula et al.,
2007), to myriad case studies on local livelihoods.
Regarding science policy integration, the sci-
entists themselves face challenges. Some argue
about the theoretical and methodological chal-
lenges of the sciences and their public accept-
ance, especially on environmental management.
These are often found to be uncertain and super-
ficially integrated, with competing theories and
entrenched views based on quasi-scientific rea-
soning. Hence, untested approaches can lead to
a loss of credibility (Lankkey, 2007) in the eyes
of related stakeholders (Lankford, van Koppen,
and Franks, 2004). Increasing emphasis is being
placed on seeking ways to improve the sciences-
policy interface.

DECISION-MAKERS’ ATTITUDE TOWARD
SCIENTIFIC RESEARCH IN THE MEKONG
Broadly speaking, for scientific research to have
any impact on water resource management deci-
sions, the circumstances have to be particularly
favorable in terms of the institutional means
used to influence decision-makers who must be
receptive to scientific input. In most contexts,
the conditions are not favorable. In the five case
studies below, we outline the different attitudes
or responses of government officials towards sci-
entific research in the Mekong, only one of which
approximates the presumed ideal of science-
based decision-making and participatory input.
We ask to what extent such ideals or constraints
are reflected in the big-picture of decision-mak-
ing about the Mekong.
CASE STUDIES OF THE SCIENCE-POLICY INTERFACE

There are circumstances in the Mekong where scientists are highly unlikely to have any influence, notably in cases where governments have set hydropower development as a national priority to be pursued at virtually any cost. A clear example of this is the Tasang Dam in Myanmar on the Nu/Salween River, where three-quarters of the 3,300MW generated will be exported to Thailand. Although the 228m structure will create a reservoir 670km long, inundating an area rich in biodiversity and unique species, the detailed design is being done without an environmental impact assessment (EIA). Questions raised by international organizations about the safety of the dam in an earthquake-prone area and about its social impacts and economic viability remain largely unanswered (Wong et al., 2007). The 13 ethnic minorities living in the catchment have never been given an opportunity to express their views. The government’s position appears to be consistent, at least in terms of stemming any opposition to the dam and ignoring any input from scientists. In other situations a country, or a developer, wants to be seen to be doing the right thing, but does not want to risk dam construction or flow allocations being changed by any research results. This results in superficial “science,” with EIAs and other research being done unprofessionally, without community consultation, public scrutiny or peer review. One example of this is the series of EIAs involving the Yali Falls Dam on the Sesan River Basin in the Central Highlands of Vietnam, about 70 kilometers upstream of the Cambodian border. The first EIA was conducted in 1985 by SWECO, a Swedish engineering company with an environmental wing. It claimed that the impacts of the dam would be “negligible” given the “sparsely populated” area downstream (Wyatt and Baird, 2007). Perhaps this conclusion was reached because, for some reason, the downstream study area was confined to an area 8km long and 1km wide. As a result, trans-boundary impacts on Cambodia were not considered at all. A subsequent EIA, conducted by Electrovatt in 1993, did little to change the impression of negligible impacts. On the basis of the two EIAs, construction of the 720MW dam began in 1996. As construction and then operation (2000) of the dam got underway, the impacts proved to be far from negligible. According to International Rivers Network: “At least 36 people have drowned due to erratic releases of water from the dam; at least 55,000 people have been adversely affected; they have suffered millions of dollars in damages due to lost rice production, drowned livestock, lost fishing income... and houses. In addition, there has been an increase in river sedimentation and erosion, destroying river-bank vegetable gardens; hundreds of people have suffered stomach ailments, eye infections and skin rashes, which they believe are related to changes in the river’s water quality since the dam was built.” (IRN, 2002). Even if these reports are in any way exaggerated, it is quite apparent that significant impacts occurred as a result of the dam, far beyond anything anticipated by SWECO or Electrovatt. Despite SWECO’s estimates being so far off the mark — or possibly because of that — the company continued to work closely with Electricity of Vietnam (EVN) on hydropower in Vietnam including the design of the Se San 3 Dam downstream of Yali Falls. With mounting concerns being raised about the impact of these dams on communities downstream in Cambodia, the ADB commissioned an assessment of Se San 3. The study, carried out by Worley Consultants from Australia, was never officially released by the ADB because of objections from Vietnam. However, through a leaked copy, its contents have become well known. Worley describes SWECO’s analysis of Se San 3 impacts as “bad science,” with “unrealistic assumptions,” arguing that: “It does not represent a sound basin wide strategy for using water or other resources, and will lead to serious conflicts between water users within the basin. A wider and more scientific analysis, less dedicated to a single site and, dare one say, future consultant engineering work, is needed” (Worley, quoted in Probe International Briefing, October 2003, emphasis added). Again, possibly because of its superficial analysis of impacts, in 2005 SWECO was chosen by the government of Vietnam to conduct an assessment of the trans-boundary impacts of changed flows in the Se San basin, despite objections from Cambodia (Wyatt and Baird, 2007) and to do an EIA of hydropower impacts on the neighboring Sre-
pok River. The former has never been released, while the latter has been described as an "incomplete assessment and therefore inadequate as a basis either for investment decision-making or for planning mitigation and compensation with dam-affected communities in Cambodia" (Probe International, 2007). In short, SWECO’s involvement in EIAs and flow allocation assessments, while also being involved in dam construction and energy master planning in Vietnam, represents an unequivocal conflict of interest.

As noted above, when scientists are hired as consultants to undertake flow allocation assessments, they are very likely to be under pressure from the developer to produce favorable results, or risk not being employed again. An example of this is the case of the Theun Hinboun Hydropower Project (THHP) in Laos, (owned 60 percent by the government of Laos), which diverts water from the Theun-Kading River through a tunnel into the Hai and Hinboun Rivers.

When the project was completed in 1998, the ADB claimed it would be environmentally benign and would not impact people's livelihoods. However, when the International Rivers Network reported that all villages downstream had experienced a loss of fisheries, the ADB called for the realization of the proposed project, the government supports more than one assessment and then ignores the key research findings and recommendations of its own committee. A clear example is the Pak Mun Dam in 2002 in Northeastern Thailand. This case shows an interesting mix of decision-makers attempting to respond to scientific findings, popular protest and political power at the same time.

The Pak Mun Dam was commissioned in 1994 by the Electricity Generation Authority of Thailand (EGAT) as a run-of-the-river hydropower dam. It is located 5.5 km west of the Mun River confluence with the Mekong and has a 17 m high wall with a 60 km$^2$ reservoir. Its original design was modified to reduce the resettlement limit from 4,000 to 248 households.

Considering the modest size of Pak Mun, and the fact that it was redesigned to accommodate social and environmental concerns, it has, nevertheless, sparked a considerable amount of controversy. A key reason for this is that the 1983 Impact Study did not include a comprehensive assessment of fish species, or of how the dam might change household access to fish. Instead, it presented highly optimistic estimates of the benefits that would be obtained from stocking the reservoir with fish and essentially ignored the likely impacts of lost fish habitats and migration routes (WCD, 2000).

From the beginning, local people were opposed to the Pak Mun Dam. The blasting of rapids below the wall had an immediate impact on their fisheries. Opposition to the dam gave birth to a powerful people’s organization known as the Assembly of the Poor (AoP). Supported by many NGOs and academics, the AoP claimed that the commissioning of the dam had harmed their livelihoods because it had prevented the migration of fish from the Mekong and inundated their riverbank gardens. The AoP used a variety of methods to pressure successive governments over a decade, eventually convincing the government of Thaksin Shinawatra, which came to power in 2001, of the need to negotiate (Manoram and Hall, 2009).

In 2001, the Thaksin government agreed to re-examine the impacts of the dam with a view to considering whether or not to open the dam gates to allow free river flow. This resulted in the creation of various committees and a flurry of parallel scientific research efforts, none of which had any real impact on decision-making, because the government simply ignored the research that it did not favor.

According to a sociology lecturer at Thammasat University, who was a member of the Committee on Overseeing and Monitoring the Pak Mun Resolution, the decision on how to manage the dam was a “political decision.” All pretense of compromise came to an end when Thaksin was ousted from power through a military coup on Sept. 19, 2006, and the new government issued a resolution to keep the dam's sluice gates closed year round.

In short, the Thai government paid little attention to the results of the research it commissioned. It paid even less attention to research carried out by impacted peoples and NGOs, claiming that this was biased and romanticized due to their known anti-dam development position. Instead, the government created a smoke screen by appearing to support scientific research while pursuing its own objective to maintain dam operations for as much of the year as possible.

In an ideal context, decision-making on flow allocations would be based not only on solid scientific findings but also on stakeholder participation. For this participation to be meaningful, stakeholders need to be involved in all stages, agreeing on such issues as (i) the scope of services, (ii) the approach to the work, (iii) avoidance of conflicts of interest and (iv) commitment to accepting the final outcomes and recommendations (Bantita, 2006). The obvious question to ask is whether or not such “ideal contexts” ever exist. Is it possible to identify situations where assessments have been made in contexts that at least approximate this ideal?

The case is the Hua Na Irrigation Project on the Mun River in Northeastern Thailand, completed in 2000. This is a 2.1 billion baht investment where flows have yet to be allocated for the intended purpose (irrigation), because of opposition from local communities. The case is worthy of further examination because it is an example of what can happen when an EIA — including a social impact assessment — is not done properly at the outset.

The project was planned to provide water to more than 10,000 households living in 61 communities in Si Sa Ket Province (Department of Development and Energy Promotion, 2000), but was never inaugurated because a virtually equal number of local residents protested about the
likely loss of their aquatic resources. A key point in the controversy was that a full, reliable and comprehensive EIa was never undertaken before project implementation. It was argued that the "people's perspectives" on the anticipated benefits, and on the costs and social consequences of the project, were never extensively studied (kanokwan et al., 2006). Instead, a rapid top-down exercise was conducted that left none of the parties satisfied. Consultants hired by the royal irrigation department (RID) were accused of being careless, and of having conducted a superficial EIa (Jhongchayi and prane, 2004).

Affected villagers, with the support of NGOs, insisted that the EIa should have been done prior to the project design and implementation and that the project should not be allowed to operate until a comprehensive exercise was completed. To help resolve the dispute, RID accepted, in 2007, that a "people's EIa" (PEIA) should be conducted involving all the key stakeholders, plus independent researchers. RID gave scientists an opportunity to play a facilitating role in assisting the government, the villagers and NGOs to work together.

The PEIA also provided an opportunity for those most directly impacted to determine the issues to be studied. As a result, the PEIA focused primarily on how the scheme should be operated: resources for people's livelihoods should be maintained and compensation should be paid in full before the commissioning of the project. The key elements of the PEIA included (i) public consultations involving all stakeholders; (ii) an active steering committee advising on all stages; (iii) frequent monitoring and reporting on the study's progress; and (iv) full participation in the final decision-making stages. Later, in 2009, the PEIA was accepted by the royal irrigation department as a way to gain acceptance from affected people (Manorom, Surasom and Noporn, 2010).

Decision-makers stand before signposts that point in vastly different directions: on the one hand, the ADB and the world bank, together with powerful national interests. On the other hand, NGOs and rural activists. The one side claims there is ample space for dams and diversions; the other vehemently denies it.

The above example suggests that scientists, under the right circumstances can play a vital role in creating a negotiated vision for flow allocations. It confirms that when agreement is reached by stakeholders beforehand on the scope of services, the methods to be used and other critical elements of research, consensus can be reached.

CONCLUSION
Scientists face particular challenges in assisting the Mekong's political and economic leaders to make informed decisions about flow allocations. Decision-makers stand before signposts that point in vastly different directions: on the one hand, the ADB and the world bank, together with powerful national interests, see the basin as a geographical space filled with abundant opportunities for the development of new infrastructure, particularly "green" hydropower. They claim this will drive regional economic growth and create win-win situations for all. On the other hand, NGOs and rural activists see infrastructure development as a potential disaster because, they believe, it will be at the expense of powerless groups whose livelihoods rely mostly on river resources. The one side claims there is ample space for dams and diversions; the other vehemently denies it.

The extent to which scientists will actually assist decision-makers in determining fair flow allocations will depend partly on the context they operate in, but equally on their adherence to the highest research standards possible. Fisher advises that before social scientists accept research consultancies they should analyze the "structures of interest" and should rule out consultancies where such interests would rule out ethical research. He goes on to suggest that researchers should assess the ethical opportunities and threats involved in social impact assessment contracts and should try to negotiate arrangements for transparency to be built into their contracts (Fisher, 2008). In the Mekong region, where the risks of results being ignored, hidden or manipulated are high, such an approach is critical. Equally important, discussions need to take place on how different types of researchers (consultants, universities, institutes, activists and villagers) can create common "spaces" and use varied opportunities to influence change.

Kanokwan Manorom is an assistant professor at the Mekong sub-region social research center, Faculty of liberal arts, ubon ratchathani university, thailand. the late David S. Hall was an affiliate researcher at the Center. This paper is a product of the M-POWER water governance network project, Improving Mekong water allocation, financially supported by the CGIAR challenge program on water and food.

REFERENCES