

# MEKONG UPDATE & DIALOGUE



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## **The Australian Mekong Resource Centre**

was established at the University of Sydney in 1997 to promote research, discussion and debate on development and environment issues in the Mekong Region. The AMRC is a focal point for information, dialogue and activities in support of an equitable and sustainable development path for the Mekong Region.

The *Mekong Update & Dialogue* provides:

- lead article on the key topic of the issue
- responses to the lead article
- news of current developments in the region
- news from the AMRC
- information on Mekong-related conferences and events in Australia and the Mekong Region

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## **EDITOR'S NOTE**

The Mekong Update and Dialogue has been running for nine years and has presented dialogue on 30 different themes over its 32 issues. AMRC is currently without core funding, and we unfortunately need to suspend further issues of MUD for the time being. We welcome any feedback that readers may have on this decision, and ideas on what a re-incarnated MUD might look like.

## **ENVIRONMENTAL FLOWS**

A core issue in any river system is that water has multiple values for many different groups of users and other stakeholders. So long as one user's benefits from water do not impact in any significant way on the quantity or quality of water available to others, rivers can continue to provide and maintain many different kinds of economic, social, cultural and ecological functions in a sustainable and non-conflictual manner.

Unfortunately, fewer and fewer river systems remain where there is a non-competitive use of water between different users and different kinds of use. In some cases, competition for use is between those upstream and downstream, commercial and subsistence, and even across national boundaries. In other cases, the main competition seems to be between livelihood and developmental uses on the one hand, and environmental values such as freshwater biodiversity on the other. In most cases, though, competition is at multiple levels.

When there is competition, how much water does "the environment" need? How long is a piece of string? Clearly the answer depends on what sort of environment we are talking about, and what kinds of environmental attributes, assets and services are most valued.

In the Mekong, these questions arise in the context of a large transboundary river that, compared with other large river systems, maintains many core ecological functions. This is in large part due to the quite limited degree of impoundment and diversion of water. Yet the questions are raised because of heavy pressures to impound and divert the river in the name of development and poverty alleviation.

Environmental flows methodologies deal with the challenge of developing and managing river systems equitably and sustainably. As the articles in this issue of Mekong Update and Dialogue show, the Integrated Basin Flows Management program thus takes the Mekong River Commission into what should be the core business of a river management agency - using a combination of science, societal preferences and principles of equity and sustainability to manage in the interests of the river and those who depend most on it for their livelihoods and way of life. A key challenge to the program is for it to become more consultative and open.

There is another contextual consideration. Environmental flows methodologies have been developed in the context of South Africa and Australia, dry countries that have grossly over-allocated the water in their rivers for developmental purposes. Environmental flows in this case means clawing back some of that water for the environment, and determining what the flow patterns and quantities need to be for ecological and subsistence purposes. In the case of the Mekong, there is a risk that environmental flow requirements can be interpreted as a question: what is the minimum amount of water needed for the river under an optimum flow pattern so that we can appropriate the rest for commercial use?

# FEATURE

## River flows and development in the Mekong River Basin

by Hans Guttman

River systems need water to maintain themselves and their functions, uses and benefits. Around the world, degraded river systems have prompted different responses to restore particular values of the river system that are perceived important but were lost in the process of water resources development. For example wetlands are being restored in many parts of the world (e.g. Yangtze River), in other areas water infrastructure is removed to restore flows and migration routes for fish (e.g. salmon).

An 'environmental flow' is the provision of water within a river system to maintain downstream ecosystems and their benefits, where the river system is subject to competing water uses and flow regulation. Since regulation of flow can occur through direct infrastructure (like on-stream dams) as well as through diversions of water from the system (e.g. pumping irrigation), there are different ways in which environmental flows can be provided. (IUCN 2004).

Environmental flows are vital for healthy functioning river systems, which in turn are critical for attracting investment, achieving long term economic prosperity and the conservation of biodiversity. Environmental flows work for people as much as for plants and animals. (IUCN 2004)

Environmental flows are flows of a particular quantity, quality and timing necessary to ensure a healthy river system from economic, social (including cultural) and environmental perspectives. Although the goal for environmental flows is to provide flows sufficient to sustain the river in the long term, the degree of 'good health' at which the river will be sustained is a judgment that will vary according to the environmental, social, economic and political imperatives governing the river basin. What is an appropriate environmental flow for a particular river will depend on the values for which the river system is to be managed. Provision of environmental flows is thus not a scientific question. The science (in various forms) is available (being used in over 50 countries in several hundred different applications), and our knowledge and understanding of what systems require to function, and how to meet those requirements grows steadily. Fundamentally the provision of environmental flows is a social issue. It is about changing our thinking about the way water is used and managed, ensuring a balance between competing uses and recognizing the value of products and services provided by the river system. It is for this reason that the question of values is fundamental to identifying environmental flow requirements, and quantifying and providing for the costs of providing such flows.

### Environmental Flows in the context of the Mekong River

As development of the Mekong River's water resources continues, the flow regime of the river will change, triggering changes in the river ecosystem and in the lives of the Basin's people. The great dependence by the majority of the Basin's people on the products and services from the natural ecosystem

necessitates that development decisions require balancing of the economic and social benefits of development with the environmental and social costs. A wide range of data is needed to inform these decisions. This is where the Integrated Basin Flow Management (IBFM) work being undertaken by MRC is focused, aiming to provide information and knowledge to decision makers of flow changes and their consequences.

The practical experience around the world of applying environmental flow assessment have mainly been on smaller systems, often highly regulated, with an aim to restore some functions or values which has been lost (or were diminishing rapidly). Applying flow assessment to larger system has often focused on restoring a specific component, such as salmon fisheries. The application of a comprehensive and holistic assessment to a large system, which is still in relatively unmodified condition (such as the Mekong River), is un-usual and in the context of Asia unique. Under IBFM a particular approach, the Mekong Method, is being developed based loosely on the holistic approach in DRIFT<sup>1</sup> (Downstream Response to Imposed Flow Transition).

### IBFM activities

The IBFM activities currently encompass three components over the period of 2004-2009. IBFM 1, already completed, was a one-year hydrological assessment of the Lower Mekong Basin. An important outcome of this work was the publication of an *Overview of the Hydrology of the Mekong Basin* (Mekong River Commission 2005). This provided the basis for further analysis of the flow into components (Table 1) and zones (Figure 1) which could be analysed separately with respect to flow changes.

During 2005 a first basin-wide flow assessment was completed, IBFM 2. This gave a first approximation of the environmental, economic and social benefits and costs of a number of possible future flow regimes (Figure 2). Each flow regime represented a combination of possible future basin development activities in the medium term (for the coming 10-30 years), focusing on development of hydropower generation and irrigation. All three flow regimes consider combinations of possible irrigation and hydro electric power (HEP) developments in the basin. Other

Table 1 Mekong River flow seasons for IBFM flow assessment

No	Flow season	Some examples of ecological significance	Approximate time of year	Summary statistics
1	Dry-season low flows	<ul style="list-style-type: none"> <li>Provide habitat for fish and other food organisms in the dry season</li> <li>Control salinity wedge in delta in dry season</li> </ul>	December to April	<ul style="list-style-type: none"> <li>Start and end dates, year by year</li> <li>Mean discharge and standard deviation</li> </ul>
2	Transition period 1	<ul style="list-style-type: none"> <li>Small flood peaks (freshets) trigger fish migration and facilitate movement along the mainstream</li> <li>Improve water quality</li> </ul>	May	<ul style="list-style-type: none"> <li>Start and end dates, year by year</li> <li>Number and size of flood peaks</li> </ul>
3	Flood season	<ul style="list-style-type: none"> <li>Inundate floodplains</li> <li>Provide fish spawning areas</li> <li>Store water on floodplains for release in dry season</li> </ul>	June to October	<ul style="list-style-type: none"> <li>Start and end dates, year by year</li> <li>The percentage of years with each of the following sub-categories:                             <ul style="list-style-type: none"> <li>High peak, high volume</li> <li>High peak, low volume</li> <li>Low peak, high volume</li> <li>Low peak, low volume</li> </ul> </li> </ul>
4	Transition period 2	<ul style="list-style-type: none"> <li>Timing of downstream fish migrations</li> <li>Floodplains drying out</li> </ul>	November	<ul style="list-style-type: none"> <li>Start and end dates, year by year</li> <li>Rate of recession</li> </ul>

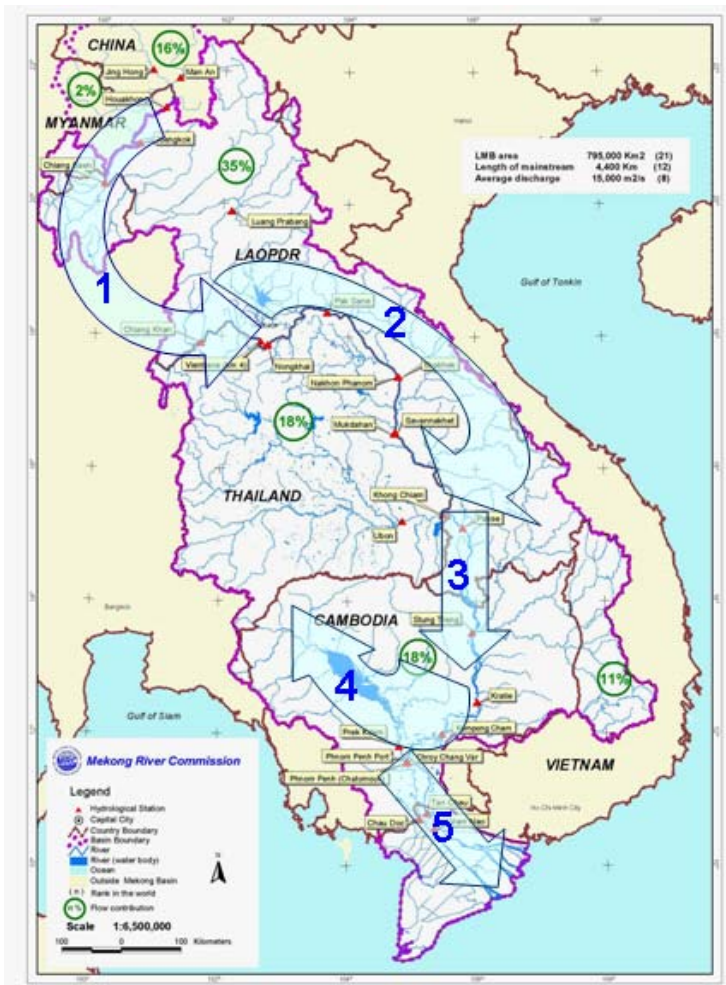


Figure 1 Five zones for IBFM flow assessment

flow regimes representing different combinations of possible development activities could and probably should be considered in future flow assessments as the three flow regimes assessed may not include all the development options considered by the member-States. This approach has not been used in the Mekong Basin before and the results are contributing to the holistic approach to basin planning and management promoted by MRC (specifically under its Basin Development Planning process).

IBFM 2 gathered a multidisciplinary team for an initial study of how the flow assessment work under the Mekong Method should be undertaken. The team consisted of specialists in environmental flows impact assessment, hydrology, hydraulic and hydrodynamic modelling, geomorphology/sedimentology, water quality, botany, aquatic invertebrates, fisheries, herpetology, ornithology, sociology and economics. Their joint activities produced three streams of information, each providing important insights in its own right as well as being part of a comprehensive picture of possible change:

1. A biophysical assessment of how the river and its resources could change as a result of development-driven changes in flow.
2. An economic assessment providing a first approximation of the value of all the major present attributes and beneficial uses of the river system, and of how these could change with a changing river. Some beneficial uses (e.g. fisheries) could be expected to decline and others (e.g. hydro-electric power) to increase.
3. A social assessment of how the changing river could impact – both positively and negatively - people living near the river and in the Basin.

It should be recognized that this initial assessment was limited by the approach and data availability. The methodological limitation was the use of an expert panel approach, where the predicted impacts on identified indicators and beneficial uses were based on the specialists' subjective assessment rather than objective verifiable relationships. Lack of data and information on particular issues limited the understanding of how the different flow regimes would change these parameters from the present status. Nevertheless, synthesizing the existing information and providing predictions on changes provided new insights into how the river system may change in response to changes in flows.

The IBFM 2 study concluded that:

- Much of the Mekong River system is in relatively good condition but locally some ecosystems components have been severely degraded.
- There is room for further water-resource development without severe ecological degradation of the main stem river. Although dam construction and operation on the tributaries will result in significant local impact this is unlikely to translate into significant hydrological changes on the main stem.
- More development would be possible for the same level of resource degradation if development proceeded with good up-front planning, project design and operation, such as linking increased water withdrawals with increased storage and managing water release patterns in a manner to minimize deviation from natural flow changes

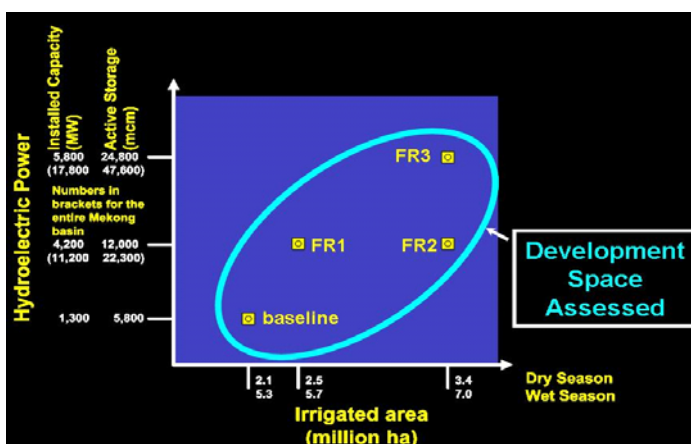


Figure 2: Framework (flow regimes) for the IBFM flow assessment. Note that numbers on the y-axis which are not in brackets are for the Lower Mekong Basin whilst those in brackets are for the entire Mekong basin.

- On a macro scale, much of the social impact associated with increased development of water and related resources in the Basin will be positive. However, distribution of costs and benefits as well as equity issues are ongoing topics of research. The study indicates the importance of taking into account the predicted environmental degradation and putting in place measures to achieve the intended goals of poverty alleviation and equitable economic growth.
- There are some important areas of concern requiring further study, including the vulnerability of the Tonle Sap and Cambodian floodplains (zone 4) to possible flow changes, significant changes to the vegetation in protected areas in southern Lao and northern Cambodia (nominated and existing Ramsar sites, in zone 3), changes in bank erosion between Vientiane and Pakse (zone 2) and the maintenance of deep pool habitats for fisheries.
- The findings provide detail upon which discussions can begin, both within countries and between countries, on possible trade-offs between development and resource-protection.

IBFM 2 constituted part of the Mekong Wetland Biodiversity conservation and sustainable use project (a joint programme with IUCN, UNDP and MRC). It has also provided an enabling framework for sustainable development through which member countries can agree on procedures regarding maintenance of flows on the mainstream.

IBFM 3, which is a four-year research programme building on the experience gained in IBFM 1 and 2, commenced in 2006. The major knowledge gaps identified in IBFM 2 were converted into a research plan and the international and riparian team of specialists met in April 2006 to commence this important new work. The research in 2006 focuses on filling the major knowledge gaps identified in IBFM 2, these include; hydraulic modelling for zone 1-3 (Figure 1), sediment transport model for zone 1-3, river bank stability and bank erosion, dynamics of deep pools, fish guilds, increased inundation of SiPanDone (proposed RAMSAR site for Lao PDR)

Each year, from 2006 to 2008, the teams will disperse along the river and through the Basin to collect data and improve their understanding of how the river functions and of its importance in the lives of its people. At the end of each year, findings will be summarized at a Data Review Workshop, and the predictions of change that came from IBFM 2 will be reviewed and revised if necessary.

In IBFM 3 a parallel process of stakeholder consultations is initiated. In cooperation with the National Mekong Committees the MRC Secretariat is using the technical documents from IBFM 2 to prepare more easily understood materials aimed at a broader audience. Much of the materials will need to be translated into the riparian languages before use in broader stakeholder consultations. By late 2006 a number of consultations with government line agencies, local and international NGOs and academia is expected to be undertaken. The feedback from these consultations will guide the research focus in 2007 and onwards.

It is recognised that the information gained under the IBFM process needs to reach a broader target group than indicated above and in 2007 the stakeholder consultations are expected to include provincial agencies and local communities, for which a

different format of presenting the research findings needs to be developed.

## Flows management

The new understanding will be available progressively for use by the four national governments in their decision-making processes. At the same time the technical capacity within the member countries to undertake flows assessment will increase. However, it should be recognised that the IBFM is only one tool for providing information and knowledge to base development decisions on. The Basin Development Planning (BDP) process of the MRC has a number of tools at its disposal, including Strategic Environmental Assessment, Resource Allocation Model, SWAMP database of wetlands, etc., and IBFM. The IBFM process provides information which may be central to development planning in the basin allowing for trade-off discussions. It should be noted however that the IBFM process only provides the knowledge and information for such discussions and does not provide the enabling environment needed for such discussions. This may be provided by the BDP.

In conclusion the IBFM process is a central part of MRC's role in providing scientifically based information to support the decision making of its member countries in relation to sustainable development of water and related resources in the Mekong River Basin.

<sup>1</sup> It should be noted that the Mekong Method is in development and incorporates useful aspects of environmental flows assessment as well as more conventional hydrological studies.

## Bibliography

Dyson, M., Bergkamp, .G, and J. Scanlon (eds.) 2003 Flow. The essentials of environmental flows. IUCN, Gland, Switzerland and Cambridge, UK. Xiv + 118 pp.

Mekong River Commission 2005 Overview of the Hydrology of the Mekong River Basin. Mekong River Commission, Vientiane, 73 pp.

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# RESPONSES TO FEATURE

## Response 1

*by John Dore*

Negotiating water flows is an essential part of river basin management in the Mekong Region. Implementing 'environmental flows' requires establishing water flow regimes which recognise ecosystem needs whilst trying to satisfy social and economic demands. Environmental flows work<sup>1</sup> requires the integration of a range of disciplines including engineering, law, ecology, economy, hydrology, political science and communication.

Catalysed by major floods in 1999, The World Conservation Union (IUCN) is working with other organisations, such as the International Water Management Institute (IWMI) to institutionalise environmental flows work in Vietnam. The Huong River Basin is a classic case of competing uses for water, competing views about whether a flood event is a disaster or a natural occurrence, and a range of views about what should be done. In short, it is just the kind of situation where an environmental flows approach can contribute.

The Mekong River Basin is another example where environmental flows work is underway on the mainstream, led by the Mekong River Commission (MRC), as part of their Integrated Basin Flow Management (IBFM) processes. This work has many supporters – more outside MRC than inside – who want this work to be successful and contribute to river development scenario debates. To be useful, the work must continue to focus on key areas of concern. For example, it is widely known that the Cambodian people are heavily dependent on the productivity of the Tonle Sap Great Lake wild fishery which is threatened by over-fishing, and ecological disruption to the natural 'pulse' system caused by water infrastructure development and changes to the wet and dry season flow regimes. Clarifying the causes and extent of the threats, and then including that in basin development debates, is an important component of environmental flows work. In sub-basins of the Mekong, such as the Songkhram River Basin – another pulsing system – in northeast Thailand, IUCN and partners are involved in environmental flows processes with legal, economic, social and transboundary dimensions.

The lead article by Hans Guttman refers to the need to "recognize the value of products and services provided by the river system" and that "the question of values is fundamental to identifying environmental flow requirements". Most would agree. But, how to establish these values? In many parts of the Mekong Region there is a need to find a way for different perceptions of value to be expressed and heard in some type of deliberative process of exchange. The recent Mekong Region Waters Dialogue<sup>2</sup>, held in Vientiane 6-7 July 2006, was one such opportunity for public deliberation bringing together stakeholders from all over the region. Participants learned about the IBFM process. However, brief discussions at a wide-ranging Dialogue are not a substitute for the more focused public consultations which should be included in the IBFM process. The environmental flows component of IBFM is already in its 3<sup>rd</sup> phase and public engagement to this point has

been practically non-existent. Moreover, it has been a struggle to get the reports<sup>3</sup> into the public domain. There is no defensible reason for it being such a 'closed-shop'.

MRC needs to clarify its constituency, and decide how much scope to give the MRC secretariat to engage with non-State actors, such as: non-government organisations, academe, community leaders, the private sector and others in the Mekong River Basin with water-related rights, risks or responsibilities. If MRC is to be recognised as a 'knowledge broker' it needs to ensure more actors can contribute and receive information, and thus improve the knowledge base. This is particularly important in the key IBFM/e-flows activities of the Commission. It was heartening to read in the lead article that the MRC plans to include a consultation process in the future work.

A book referred to by Guttman is 'FLOW – the essentials of environmental flows'. There are mini-multistakeholder processes taking place in Cambodia, Lao PDR, Myanmar, Thailand and Vietnam where that book is being unpacked, the concepts debated, and the book re-assembled in a local language translation by teams of government and non-government actors. This is establishing a wider understanding of and constituency for environmental flows throughout the region. All these translations will be available by early 2007. Already, the book has been translated and launched by China's Ministry of Water Resources in Beijing on 14 September 2006.

<sup>1</sup> There are many different methodologies, depending on the chosen emphasis. For a recent review see Tharme, R. (2003). "A global perspective on environmental flow assessment: emerging trends in the development and application of environmental flow methodologies for rivers." *River Research and Applications* 19: 1-45.

<sup>2</sup> The Mekong Region Waters Dialogue was convened by The World Conservation Union (IUCN), Thailand Environment Institute (TEI), International Water Management Institute (IWMI), and the water governance network of M-POWER – Mekong Program on Water Environment & Resilience. For more information, see [www.mpowernet.org](http://www.mpowernet.org). 'recent events' part of the website.

<sup>3</sup> The key report for the end of IBFM/e-flows phase 2 is 'MRC (2006). Integrated Basin Flow Management (IBFM) Report #8. Vientiane Lao PDR, Mekong River Commission'. There are 17 other associated reports listed in the bibliography on p.93.

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## Response 2

*By Dr. Kanokwan Manorom*

Understanding people's livelihoods is one of the most critical aspects of the Mekong basin flow management analysis, for it will allow policy makers and planners to recognize to what a substantial extent livelihoods of the people living adjacent to the Mekong mainstream and her tributaries are supported by aquatic resources. In addition, social assessment of the flow change will let people understand which groups of people are in a position of greatest vulnerability to flow related changes in the natural resource base and the level of severity of flow

related changes for highly resource-dependent groups. In other words, these social assessment exercises are trying to understand about subsistence livelihoods that mostly rely on natural resources. Food security may cover protein and other wild food collected daily from river resources measured through indicators such as per capita nutritional intake. If the flow regime has been dramatically altered, for example by the infilling of deep pools that results from altered sediment flux, or by increasing dry season flow resulting from impoundment behind dams, changes of flow will later bring impacts on local food availability such as loss of fish resources. In the long run, severe lack of wild food resources will cause local food insecurity. Social assessment therefore will also need to focus on what are multiple and other alternative livelihood strategies that people have in order to cope with these changes.

In line with food security, income that local people earn from selling river resources such as fish and other river products is another vital factor of flow related changes. In the riverbank communities, income derived from river resources is a crucial base of household security. If people living along the river were to lose their income as a result of flow changes, other livelihoods would be affected such as less access to school, health and other assets such as buying some more pieces of land. Thus extensive study on impact of flow changes related to income security is clearly needed.

Lastly, changes in social and cultural aspects such as rituals and ceremonies related to the river as a result of flow related changes are significant. These social and cultural aspects of livelihood include water festivals, *Naga* fireballs, boat racing, water spirit worship and so on. These are also critical areas for extensive analysis of the IBFM since these aspects are regarded as a core of communities' ties to, pride in and attachment to the river. Any changes caused by infrastructure development projects such as hydropower dams will bring both costs and benefits to local people. Who would bear the social costs and who will gain the economic benefits of the flow changes must be clearly identified and explored.

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## UPCOMING EVENTS

### **International Conference: "Critical Transitions in the Mekong Region"**

29-31 January, 2007, Chiang Mai, Thailand

Contact: Regional Center for Social Science and Sustainable Development (RCSD), Faculty of Social Sciences, Chiang Mai University, Chiang Mai, Thailand  
<http://rcsd.soc.cmu.ac.th/>

The events listed above are changed with each issue of Mekong Update & Dialogue. For a complete list of upcoming events please go to our website at [www.mekong.es.usyd.edu.au](http://www.mekong.es.usyd.edu.au). For submission of new events please contact the AMRC Administrator at [mekong@mail.usyd.edu.au](mailto:mekong@mail.usyd.edu.au)