

## **The politics of scale in the assessment and management of environmental change**

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### **1 Introduction**

This paper argues that the choice of scales in assessment and management of environmental change is often determined by politics as much as the characteristics of the ecosystem or natural resource under consideration. By politics I mean that different interests group intentionally use rhetorical arguments about scale to serve their own interests, and that ultimately the choice of scale for analysis and upon which decisions are made is a reflection of the strength of their interests in the resource in question and relative power. Moreover, which ever levels and scales are eventually adopted, these choices often work to reinforce the initial decisions, further privileging the interests of favored resource users over others. Scale “choice”, is not always explicit, but maybe embedded in the structures and processes of society, that make activities and differences at certain levels visible or not. Thus, the central administration of a bureaucracy sees society and the landscape from a particular “high” vantage point with limited resolution to see differences among sectors, livelihoods and places. Policies, management systems and the science of assessment used to support them, are assumed to seamlessly scale up or down.

Ecologists will typically argue that there are “real” scales in nature and that *if only* we could get the institutional arrangements to match them, that is, fit, our problems of analysis and management would be over. On the other hand, political geographers are quick to point out how scales are social constructions. A secondary aim of this paper is to show that neither of these views taken at their extremes is correct. Relevant scales are jointly produced by interactions between social and ecological systems over time.

Politics of scale situations arise when there are significant cross-scale interactions present in a system whether within the social, the ecological or across both linked systems. Recent theoretical work in disparate disciplines underlines the importance of cross-scale dynamics for understanding both environment and political change (Holling et al. 2003; Pritchard & Sanderson 2003). A central thesis of this paper is that a key to resilient systems is accepting complexity and harnessing cross-scale dynamics. Effective political arenas, in which the interests of various stakeholders can be declared and preferences re-negotiated are essential.

This paper is organized in five sections. The first argues why we need to be concerned with the politics of scale, offers some conceptual tools for thinking about scale and introduces the primary case study, water resources management in Thailand. The second section explains the origins of scale. The third explores the role of alternative discourses in creating politics of scale. The fourth probes more deeply the structural characteristics of scale politics. The paper ends with suggestions about how understanding the politics of scale in a complex world might be harnessed for better environmental management. Throughout the text examples are drawn from the history of water and watershed management in Thailand to illustrate the nuances of the “politics of scale”.

### **2 Scale matters**

#### **2.1 Simplification and vagueness**

James Scott, in his book “Seeing like a state”, shows how states make use of appeals to wider interests as they go about simplifying diverse local systems. States, for example, have historically placed great emphasis on unifying systems of measurement within their boundaries, and later as international trade has grown also beyond them. Similarly, the diverse local customary arrangements regarding land and water resources, especially where they included forms of common property right arrangements, need simplification so that who should pay taxes would be unambiguous and land re-allocation could be controlled. The process of state simplification

ultimately serves the interests of the state, whether for the collection of taxation revenues, or recruiting bodies for labor or warfare.

Vagueness about the different levels may even lessen conflict or create arenas for negotiation and debate, whereas strong cross-scale interactions help to emphasize the importance of scale considerations to actors in the system. Scale-issues often need to be made visible. It is often in the best interests of powerful participants in environmental management to downplay and overlook issues of scale that would otherwise threaten their hegemony and legitimacy. To explore the politics of scale, therefore, often requires asking and then answering “un-masking” questions that make scale more visible. This is especially true, where the state can use appeals to national security interests or “sensitivity” to squash debate, for example, as was the case for the Three Gorges Dam on Yangtze River (Simon 2003, better cite?).

The adoption of a particular scale in assessment set bounds on the types of problems that can be addressed, the modes of explanations that are allowed, and which generalizations are likely to be used in analysis. This applies to temporal and spatial scales as well as institutional levels.

The range of ecosystem services that are directly used and acknowledged as having important support functions is dependent on socio-cultural contexts, and these are restricted in space. As the assessment is conducted at progressively larger scales, the number of services which are fully shared among places, and thus can be mapped ‘wall-to-wall’, drops. The local services that would be visible in a local assessment may no longer be visible in a sub-global or global assessment. The same basic ecosystem processes (eg net primary production) can be seen as providing different services at different scales; timber at the local scale, but carbon sequestration at the global scale. These issues are critical for assessment, and ultimately how research-based knowledge is used in policy, because of the likelihood of trade-offs between the services. At various scales we need to ask: ecosystem service for whom?

Analysing these trade-offs requires understanding of politics and markets. Many such cross-scale ‘trade-offs’ are not perceived as such, but instead become conflicts or crises created by a more powerful group (often the state) around the provision of one favored form of ecosystem service from which they can obtain rent or other benefits. Scale can be an argument that empowers the state institutions. Most states view indigenous knowledge and institutions as local in scope, relevance and power, whereas the rules and knowledge of the state as bigger in scale, scope and significance (Scott 1998).

Choice of time scales is equally important. If an assessment is focused on short term concerns then ‘important’ goods and services are those which are already or about to be threatened, such as freshwater resources for drinking, or fuel wood supplies and food production. On the other hand, if the users are more concerned with decisions that may have consequences over time spans of several decades to centuries, then issues of alterations of carbon balance or opportunity and resilience costs of biodiversity loss become much more important.

Adoption of a global scale immediately places like issues such as climate change or carbon management at a much higher priority than say sanitation or access to clean drinking water.

Because the choice of scale (in assessments and management) affects access to resource or decision-making over resources it is contested. Disadvantaged groups will ignore and resist scale change whenever they can. The capacity of the poor to directly influence these processes, however, is often limited to low-level resistance or narrow windows of opportunity created by political crises.

The discussion so far may give the impression that the politics of scale for the environment is primarily about definitions and choices over levels in space and time. In many environmental conflicts the contested issue is often whether “space” should even be the primary consideration or not, or whether it should instead be “people” or “livelihoods”? Although many arguments in politics (in this paper) involve issues of spatial scale, that is, from small to larger geographical areas, this is not the only “scale” for which a ‘politics of scale’ analytical lens is useful. Four other scales (or scale-like variables) that will be considered at various points in this paper are the ideas of (a) levels of organization in political and bureaucratic systems (b) wealth or social class in society and (c) levels of generality in knowledge systems and (d) levels of rules in institutional systems. The idea of scale implies that some kind of at least ordinal ranking is possible, but doesn’t mean that the levels in use or being contested need be mutually exclusive or even broken into discrete levels at all.

## 2.2 Mechanisms and framework

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To help guide the theoretical review and illustrations from that water management and policy that follow I propose an a conceptual framework based around a set of questions (Table 2). These should help understanding of the mechanisms by which the politics of scale influence (and are influenced by) environmental assessment and management. These ideas are inspired by literature on institutional interplay as part of studies of the formation of international regimes (Young 2002; ) and interacting adaptive cycles, or panarchy, arising primarily from studies in ecology (Holling et al. 2003). The purpose of the framework....

-> consider discussion of Young / Ostrom – possibilities of scaling up institutional insights and rules (or scaling down)\

**Table 2.** An initial framework for exploring the politics of scale

<b>Scale Features</b>	<b>Example questions</b>
Boundaries	How are boundaries set? Which areas, people, livelihoods are included whether negatively impacted or claimed as beneficiaries of environmental change or its management? How important is fit to ecosystem boundaries ?
Resolution	How is diversity (heterogeneity) handled? Who does it include/exclude? Which services are visible and which are not?
Temporal scales	What is the time-frame for considering risks and benefits? How frequent is monitoring and evaluation, planning cycle? (cf. with resource dynamics). What are the length of delays/gridlocks? How long do projects last? How do “projects” and “budgets” help create scale (levels)?
Extent (physical area)	Above and beyond issues of boundaries: are arguments made about minimum “viable”/efficient size for management? Or opposite “unwieldy” etc. if too big?
Cross-scale linkages	Are their mechanisms to facilitate (or hinder) actors who normally operating at different scales? Why are these mechanisms in place?
Hierarchy , nesting, Scale visibility	Is there explicit recognition of scale? For example, through hierarchical organizational structures, nesting of functions etc. Is this just administrative network (self-) organization or is it aimed at coping with scale (level) specific issues? Are the levels accepted by all actors?
<b>Ecological service</b>	
Value and service	Which values and hence which ecosystem services are considered in the decision? Is <i>nature</i> spoken for, and if so, by who (why) ?
Resource dynamics	How important are characteristics of the resource for generating scale politics? That is, how important are features like: rates of renewal, substitutability, connectedness, mobility or transferability?
<b>Actors</b>	
Membership	Who is included? Who is excluded? From the dialogues, negotiations, reviews, evaluations or other kinds of arenas?
Authority	Who is vested with authorities and responsibilities? What are the jurisdictional boundaries? How is accountability (upward/downward) supposed to operate, and does it?

Knowledge	What are the sources of knowledge used in debates, to back arguments, and opinions? What are the key assumptions and motivations? How were assessments done? What was their mandated scope?
Institutions	What are the formal and informal rules of play? Who is allowed on the field (in the arena)? What issues are open for exploration and which are not? Who initiates and maintains the arenas for dialogue and negotiation?
Networks	How are the actors organized into networks? How does this affect their capacity (and power) to influence scale choice or operate at multiple scales?
Interests	What are the interests of the primary actors? What is their stake in the natural resource in question? Why are they arguing for a particular scale arrangement? What benefits do they, or could they derive?
<b>Triggers</b>	
Crises Narratives	What exactly is being forecast? Is it plausible? Who are the victims, and evil-doers in the story? What salvation is being offered?  How is confirmatory evidence used? How is the narrative repeated and marketed? What is the underlying basis for the belief in the narrative?
Resource Thresholds	(Reversibility, difficult return path –hysteresis)
Conflict	Is conflict present? Are there mechanisms to resolve it? Do these privilege actors at one scale over others? How? Is the conflict scale-related or scale-driven?

### **2.3 Water resources in Thailand**

The history of water resources management and conflict in Thailand provides several good illustrations of how scales matter. The north, as the upper reaches of the water supply for the Bangkok metropolitan region, industrial capital and central plains “rice bowl”, and the northeast as the poorest, dry and least developed region flowing into the Mekong, have been the focus of large-scale state development projects centred around water resources. Many of these projects conceived and made possible by international donors and agencies. Important water related problems that have erupted on the public policy agendas in the past decade include: dry season allocation, ground water depletion, impacts of upland farming on water supply and quality, efficiency of irrigation schemes and farming practices, the priority given to urban and industrial users, and what kind of institutional reforms should be introduced, provision of individual or collective water rights, direct water pricing for irrigation, new organizations like basin committees, water use groups, and national committees (Christensen & Boonlong 1994; Molle 2002). The relatively high profile is in part the result of the seasonal dryness of large parts of the country intersecting with very sharp rises in water and electricity demand accompanying economic growth and industrialization.

Like many other countries Thailand is plagued with multiple water agencies with overlapping and unclear mandates and responsibilities as well as strong organizational interests and close linkages between bureaucracy and party politics (Figure 1). As many as 30 departments in 7 ministries are involved (Arbhabhira *et al.* 1988). Some of the key actors in the Thai system are the Royal Irrigation Department (IRD), the Electricity Generating Authority (EGAT), the PM Office, the Bangkok Municipality, Chamber of Commerce, Industrial Estates. External actors have also been influential, with the much of the recent pressure for reform coming from the Asian Development Bank, for example, the imposition of a water tax as a condition on an agricultural sector loan that was subsequently the focus of protests at their Annual Conference in May 2000 and split the Thai administration (Tadem 2002).

Juxtaposed with a long-history of centralized planning and rule-making through the Royal Irrigation Department, are local institutions over micro-irrigation, such as the *muang fay* systems

of the northern valleys (Vankerk 19xx). Right of access to irrigation water is seen, by a large portion of the farming community, as a traditional right, associated with long history of wet rice cultivation. Strong competing sectorial and institutional interests, has ensured that any attempts to introduce, head-on, rapid or drastic reforms to the water sector have had to be tempered. On the other hand significant changes in water use continue to unfold as industrial transformation and modernisation proceeds, with agriculture progressively using less of the overall allocation each year, and farmers adapting as best they can to a declining and fluctuating dry-season supply (Molle 2001).

Upland and lowland areas of basins have typically been under different jurisdictions and treated under different mental models. "Watershed" applied to uplands has been a social construction to justify control of forest and land resources (Laungaramsri 2000).

The current direction of water resources development for irrigation is reflected in the National Water Policy and Vision of the Royal Irrigation Department (Budhaka et al. 2003). The vision states: *"By 2025, Thailand is projected to have sufficient water of good quality for all users through efficient management, organization and a legal system to ensure the equitable and sustainable use of its water resources with due consideration to the quality of life and participation of all stakeholders."* The vision is to be implemented under a nine point plan covering: (1) promote completion of draft Water Act; (2) creation of national and river basin level water management organizations with supportive legislation; (3) establish efficient and sustainable individual river basin water use priorities and clear water allocation criteria (beneficiary cost sharing, ability to pay, level of service used); (4) directions of water provision and development; (5) service delivery of water to farmers and domestic uses in way similar to other basic govt services; (6) create awareness of water value through education; efficiency/conservation; (7) promote /support participation; (8) flood and drought protection; (9) financial support for water research and information transfer to public.

-> need a concluding set up phrase ... that reflects on vision above... and shows how examples will be used in text to come...>

**Figure 1.** Structure of water management in Thailand emphasising spatial, temporal and governance scales.

### **3 Where scales come from**

#### **3.1 Socially produced**

Over the past decade there has been a burgeoning literature unpacking the conventional belief that scales were somehow given. Swyngedouw (1997a,b) and other political geographers have documented for diverse situations how different social actors constrain, create and shift scales to serve their own interests. Scales are, at least in part, socially constructed. Scale choice, definitions and analyses are contested (Rankin 2003). Actors can change power and authority by working at different spatial scales (Leitner 2003). They can alter access to resources, and the decision-making processes with respect to those resources. Scales can be a means of inclusion or exclusion (Herod 1997). Requiring or making an analysis at a particular scale may in itself be an expression of power (Swyngedouw 1977a).

Rather than seeing scale production as a one-way process it is more accurate to think of it as a co-evolution between social processes and scales. Actors (help) produce scales through their activities, and scales, in turn, constrain and guide these activities by providing (or taking away) resources (e.g. Williams 1999). Nations states work to make people and the landscape fit the scales they have designated in their plans and systems of accounting and monitoring (Scott 1998). The construction of scale, therefore, is likely to be an on-going dynamic economic and political process (Delaney and Leitner 1997). Scale and scale changes can empower and dis-empower.

Taken together this relatively recent body of work suggests several new kinds of questions that need to be asked about assessments of environmental change. If scales aren't given but constructed, we should ask: who proposed or made up that scale? How were they able to convince

others that it was the “right” one? Why was that scale adopted? Whose interests were being furthered?

Scale (level) emerges or is inherent in the choice of vantage points. If we look at the landscape on foot we notice the multiple layers of growth and diversity of shrubs in the fallow, but from the airplane or satellite we “see” areas without lots of tall trees – but acknowledge there may be a few. If we sit in the TAO office we see a landscape with 11 villages 25 clusters of houses, three watersheds, 2000 cattle and countless chickens. From the central office in Bangkok Om Koi district is a small polygon near the NW edge of the map, that only by standing on a chair and peering closely can you see that it is connected by a thin red-line, a single “2<sup>nd</sup> class road” to the tangle of markings around Chiang Mai and the deep greens and lines spiraling towards a greater purpose, Bangkok.

Different stakeholders, agencies adopt different vantage points, normally those which allow them to see their interests, their mandated measurement responsibilities, clearest. It is a frequent claim of the state bureaucracy that the measurable properties seen from their vantage point are somehow the more scientific, or otherwise appropriate ones, for development planning, for environmental management. Incapacity to handle complexity is a driving force for adopting higher and higher advantage points until everything blurs into a pleasant uniformly dull green. The possibility of alternative vantage points, not even considered or acknowledged. A process that Scott (1998) aptly describes as state simplification.

### **3.2 Ecological influences**

Scale is clearly socially constructed. But are the kinds of scales *used in environmental assessment and management* purely social constructs or are they also, in part, the result of the ecological landscapes that societies have evolved with? A consideration of how irrigation and water management systems evolve shows that spatial scales can be socially and ecologically co-produced (cf. Sneddon 2002).

Physical and ecological scales are important for the size of production patches, irrigation units and may be even village sizes and organization that emerge in landscapes. Thus different groups of irrigators in the mountains of the Latin America were able to exploit differently scaled hydrological, sediment and vegetation contexts (Zimmerer 2000).

Although an ecological-orientation frequently results in arguments for basin-based management even then deciding the appropriate levels or sub-systems may be difficult given the complexity of human interventions in water (Sneddon 2002). Moreover, basins rarely correspond to jurisdictional boundaries and there are wider social and political processes that determine how water is allocated and used.

In 19xx the earlier “water divisions” of the Thai government were restructured to correspond hydrological units, a system of 25 major river basins. This was quickly followed by an assessment of the water resources and problems in these basins,.....supported by..... (Alford 1994?).....Water resources development policies are now supported by master plans for each of these basins (Budhaka et al. 2003)....

Time scales are important. The most obvious is seasonality of rainfall to which farming systems are adapted. Irrigation can help smooth out some of the short-term variation by taking advantage of larger time and space scale processes and averaging, but not all. Inter-annual variation, for example, arising out of the El Niño - Southern Oscillation in many parts of SE Asia and Southern America, is not so predictable, but farmers are aware of the longer-term variation and adapt their livelihood strategies to cope with and take advantage of these cycles.

Fish and other aquatic organisms have evolved life-cycles that are synchronized with the predictable seasonality of river flows, and livelihoods of people living along major rivers systems, in turn, are tuned to these resource fluctuations. This becomes most obvious when it is altered, for example, by dams managed for power generation, irrigation releases or flood control (Sneddon 2002). Amoros & Bornette (2002) argue that it is the interaction across spatial and temporal scales that produces the complexity and diversity of river corridors and their floodplains. The capacity to control water resources suggests that “ecological processes that cut across-scales” are somehow

been tamed by technology, but more often not this turns out to be partly an illusion revealed by unintended side-effects, for example, on fisheries.

But ecology is not everything either. Zimmerer (2002) also shows how historically the irrigation systems in the mountain landscapes of Latin America were alternatively transformed between local canal-based and basin-scale valley wide systems under different political systems. The Inca, and later, Spanish rulers, were able to irrigate the canal-based *suyus* and valley basins, reinforcing their economic power and political control of minorities. Today various community-based organizations are recreating some of the earlier smaller-scale systems, in part as a response against the perceived failures of various modern irrigation schemes. One problem they face is to taking into account cross-scale interactions needed to coordinate larger-scale patterns of water use.

*Example: Breakdown of coordination of Muang Fah traditional irrigation systems in the Chiang Mai valley has a result of large-scale irrigation works: Vankerks 1990?*

Given the importance of ecosystem goods and services for livelihoods and human well-being it is not at all surprising that the social scales around societies organize reflects, at least to some extent, larger scale ecological processes. It maybe, however, that in mature urban-industrial societies some of the “shadows” of the ecosystems upon which the city is built may be faint or invisible, but that doesn't mean there are no dependencies, only that they are hidden by complex chains of trade and off-site impacts.

#### **4 Scale Discourses**

One way we can get a better understanding of just how much, and in what way, politics impacts on scale choice and change is to analyse the discourses around scale around controversial environmental assessment and management decisions.

The classic example is “Global change”. In much writing the analysis of the physical and ecological changes are associated, almost without argument or rationale, with ideas that they imply the need for planetary or earth system management by a group of international technical experts (Sachs 1992). The argument, when made explicit, is that the “proper” scale (for management, decision-making) is global – which is beyond the nation state. A more subtle reading of global environmental change research recognizes the cross and multi-scale nature of these changes and the dangers in prioritizing those processes which a group of researcher or discipline happens to study at the expense of others. Researchers with focus on biodiversity are also likely to appeal to regional or global scales to argue the importance of particular places or consequences of development projects and policies (cf. Dudgeon 2002). The global change discourse is strong and can displace policy attention about serious problems of environmental change at much smaller scales – like securing of clean drinking water and exposure to local air pollution in and outside the home that are common and hugely important for health in the developing world.

The mere existence of international assessments on climate change, biodiversity and now, ecosystem goods and services reflects not just the realities of widespread, cumulative and interactive changes in the “Earth System”, but also the power of the Earth System discourses.

On the other hand, the trendy focus on community-led, local development, projects is also susceptible to dissection. Privileging local user groups in environmental management, may not actually lead to more sustainable practices. Pendras (2002) argues that the counter-strategies to destructive forms of globalization may just result in replacing barriers to social development.

Competing discourses, with a strong references to scale, have been a feature of political debate over watershed management policies and practices in Thailand, starting with the logging ban of 1989, that could be passed after widely publicized landslides caused <nnn> deaths in a southern Thailand village (MckInnon, ref?). Ironically these clearings for rubber plantations helped entrench the “crises narrative” that the ‘*deforestation is caused by upland farmers will cause rivers to dry up*’ (Forsyth 2000) for the northern region.

Thus, environmental disasters, like floods or land-slides, can be a trigger to put a story on the policy agenda, or confirm its validity. Positive examples of coping with or avoiding the crises, so called “demonstration cases” are also important tools (Chambers, ). Intentional and lazy repetition can turn a one-off, one site disaster or victory, into a universal truth that will be very difficult to undo (Chambers, ). Molle (2002) shows how several popular arguments in favor of water pricing

in Thailand are based on tenuous logic but which through repetition, have become conventional wisdom. Thus, a common claim made is that farmers are inefficient users of water, and that they waste water because it is free. The scale of analysis is crucial. If you look at individual farms or even state-run irrigation projects calculated efficiencies run often as low as 30%. However, at the macro and basin scales that in the dry season overall efficiency of controlled water use is as high as 88% for the Chao Phraya Basin (Molle et al. 2001). At the larger scale efficiency is high because much of the return flow from fields and canals is re-used downstream or sub-surface flows are recaptured by wells into shallow aquifers. Keller et al. (1996) in their review of integrated water resources management note that “efforts to increase irrigation efficiency at micro-level often lead to reduced irrigation efficiency at macro-level”.

Although there have been no direct charges for water, some of the taxes on agriculture, like the rice premium, which farmers paid for several decades could be used to argue against the idea of “free use” (Molle 2002). Moreover, farmers in the lower basin now need to use pumps to access water because the flows by gravity-alone are not adequate. This is costly and one of the factors already leading to efficient water use and some substitutions for wet rice cultivation.

Likewise, contrary to many newspaper and technical reports, water is already largely allocated to higher economic value sectors first (Molle 2002). The Electricity Generating Authority of Thailand (EGAT) releases 2-8 billion m<sup>3</sup> each dry season from the Bumphipol and Sirikit dams for distribution by the Royal Irrigation Department to 25 irrigation projects. Highest priority is given to Bangkok water supply, then for saline intrusion, orchards and shrimp, with inland transport and rice last. Although irrigation has the largest share on average it only gets what is left after other flows have been allocated, with the consequence that there is large fluctuations from year to year, and sometime not enough for irrigation because the area has already extended beyond the capacity of the basin.

-> add discussion about scale in environmentalism: ref to Hirsch, Pinkaew, Vandergeest, Ganjanapan ...

The mass media, invariably highly centralized in national capitals, plays a crucial role in developing scale discourses, in Thailand, newspapers like the Thai language “(The Manager)”, Matichon and Thai Rath, and the English dailies The Nation and The Bangkok Post, have been critical to political debates. Forsyth (2000) unpacks some of these debate further showing that to understand how diverse strands of environmentalism have unfolded in Thailand you need to take into consideration the social and economic class interests various brands serve. Environmentalism may help promote civil society but this a rather heterogeneous set of interests.

These examples re-affirm the multitude of ways scale is used as a rhetorical idea (see also tables 1 and 2). One of the most common tactics is using scale as way of referring to the size and power of different actors, where the state or the private sector is equated with “big” and communities or households with “small”. At the same time scale is often used as a rhetorical device to negotiate the size/extent of a problem. Often scales of analysis, phenomenon and management are intentionally conflated so as to privilege the advice or interests of one group.

Apart from looking at the discourse a fuller analysis should also look into the political agendas of the main players and what actions are actually available to effect change (Delaney & Leitner 1997). Rhetoric and action rarely match.

This is clearly been the case for the past several decades with regard to rural development policy in Thailand where there has been a massive bias in government expenditure in favour of the Bangkok Metropolitan Region (Dixon 1999; Pongpaichit & Baker 1999), notwithstanding, an often pro-rural, populist, rhetoric around election times. A common justification is an appeal to the largest scale, the national economic interest, despite the fact that this leaves a lot to trickle-down impacts for the still largely agriculture-dependent population of the country. Implicit reference to a scale of “agriculturalness” or, conversely “wealthy-urbaness” seems to lie behind much of the debate over modernization and alternative pathways of development in Thailand, but such a scale is increasingly problematic. A closer look at “rural” and “urban” livelihoods, however, quickly shows however that the rural-urban distinction is a gross simplification. Households often contain a mixture of rural and urban-type occupations. Individuals may seasonally or less regularly switch between agriculture and urban-based employment in manufacturing or construction industry.

These strategies are so common that even defining a “household” can be quite arbitrary given the amount of time various members spend in other places, and the tendency not to re-register under a complicated bureaucratic system (Rigg 1997).

Economies of scale are frequently cited in rhetorical arguments against locally-controlled small-scale development. Sometimes this accurate, but other times it is simply false, or underlines distortions in markets and pricing that make local production less competitive. When the good or service being provided is highly dependent on ecosystem goods and services, other factors, often difficult to place monetary values against need to be considered. The difficulty of evaluating these services can bias analysis in favour of larger, and sometimes even smaller scales. Jesdapipat and Kiratikarnkul (19xx) attempted to explore the full-costs of water and electricity for two small-scale hydropower projects in Chiang Mai province in Thailand where water is increasingly scarce. They note that in Thailand, mini-hydro projects are attractive because there are few sites left suitable for large dams, and public opposition to any new constructions is likely to be strong. The small service area that these provide, however, means that unit costs of electricity are higher than conventional supplies from the national electricity grid.

## **5 Scales of meaning, influence and trust**

### **5.1 Politics of knowledge**

Contests between the state and local communities, whether at the level of discourses or actions, are often played out over knowledge. Compare the claims that everywhere is special, unique or different typical of local community groups resisting development interventions and solutions of the state with those of the technocrats in the state bureaucracies and scientific establishment that typically argue that everywhere is in some ways the same, and that the scientifically produced, generalisable, knowledge should therefore be the foundations of local decisions-making, setting policy responses and environmental management decisions.

With a focus on water supply research and policy in upland catchments have concentrated on issues like, impacts of changes in forest cover on water delivery, timing and quality. Evidence of that forest clearing reduces supply is very weak or contradictory to despite widespread claims of large effects in policy debates within and about the northern Thailand region (Forsyth xx, Pinkaew 2000).

If key issue is seen as one of rising demand for water then “scale”; required is to look at entire watershed not just the upper reaches. The activities of resort owners, lowland irrigators and towns then also become part of the problem (Walker 2003). Scale choice here has political implications as it focuses attention on one group of actors only in the system – as the culprits and those responsible – whereas the demand framing obviously applies to a much larger group. Structurally this “scale choice” is embedded in law and the bureaucracy. Government agencies introduced measures to restore forest in upland catchments and restrict or forcibly move agricultural land-use by upland farmers. The official watershed classification scheme, ignoring long-history of agriculture in these areas, deems farming in these areas inappropriate land-use (and illegal) (Pinkaew 2000). Several watershed networks, combining farmers, NGOs and local activists have arisen in response to these claims about negative impacts on forest and water resources (cite).

In a welcome exception to the conventional research trend, Walker (2003) describes from his study in Mae Uam catchment in the upper reaches of the Mae Chaem branch of the Ping River Basin how increasing intensity of soyabean cultivation has led to large increases in water demand producing conflicts over water resources. Dry season cultivation has grown beyond second crops in paddy fields to include some more upland areas using sprinkler irrigation. Nevertheless water resource and watershed management has rarely considered issues of demand, but kept its focus on issues affecting supply.

Apart from a handful of studies, however, the popular press and government agencies, as described for other water related issues in this paper, continue to justify claims about hydrological impact with basically know research-based support. Repetition alone, like an incantation, is enough to turn beliefs into facts. The idea that uplands should remain forested to secure water supplies for lowland irrigated agriculture and protect cities from droughts (and sometimes floods, too) remains central in environmental discourses. An argument could be made, I believe, that

research has been steered away from understanding the scale effects of land-cover changes on watershed functions, because it would undermine organizational interests, both within the state bureaucracy and among conservation NGOs. The consequence has been that sustainability issues of greatest importance to improving the well-being of some of the most marginalized and poorest people in Thailand, the upland farmers, have been made largely invisible.

A similar argument could be made access to water supplies for the urban poor in Bangkok and provincial capitals who typically have to pay much more than the wealthy as most of their drinking supply comes from bottled water (ref). Research and development by government agencies and the academic communities they support, largely overlook the plight of the poor in informal settlements, while focussing on the larger-scale visions of infrastructure and service delivery in their plans. "Illegal settlements" whether in the hills or in the cities, are not really there, and when they are they are seen just as a problem of "leakage" or inefficiencies.

The politics of scale in the provision of public transport has parallels to those with water. Baeten (2000) argues that conventional wisdom on sustainable transport by re-defining the scale of concern (reducing emissions vs. mobility for the poor) empowers elite parts of society while further dis-empowering the marginalized. He goes on to argue that the scales used to define the sustainability problem have made invisible key issue areas that would greatly improve the well-being of the poorest. Authorities fail to consider more local scale issues like the poor's lack of access to, and control of, transport. In Bangkok the response to traffic congestion and slow trip speeds of the early and mid-90s was the construction of a set of raised expressways with tolls and the beginnings of two alternative mass transit systems (elevated rail and a subway systems). Today, travel times have greatly improved, for the wealthy that can afford the tolls of the upper layer, but down below congestion and pollution are similar if not worse than they were a decade ago. Costs in the new private-public transport systems remain high relative wages for the poor (ref).

Politics of scale frequently arise when the spatial or temporal scale of an environmental management problems don't match the proposed scales for its solution which in turn, often are a direct consequence, of scales in social organization. Ambiguity and disagreement over scale definitions may favor in-action (Kurtz 2003).

The scale at which a problem is experienced, analysed and discussed, or "scale of meaning" may not correspond to the scale of decision-making bodies (Towers 2000). Actors will often, therefore, have to behave strategically to take advantage of alternative "scales of regulation".

## **5.2 Politics of power**

The politics of scale that arises over contests about defining the scope, extent and resolution of environmental assessment and management is in part the result of the structure of political systems themselves, in other words, the scales inherent in social organization.

Through the twin processes of globalization and decentralization these have shifted. Rankin (2003) argues that, like many others critical of neo-liberal capitalism, the scale of regulation has shifted in both directions away from the democratic nation state: downwards towards politically weak communities and upwards towards less accountable transnational organizations. This shift in scales creates new winners and losers. Actors can be expected to adjust their "scale strategies" accordingly. Power is also reflected in, and reproduced by, the capacity to control and capture resources from different scales. Empowerment may necessitate acquiring the capacity to work across multiple scales. Williams (1999), for example, underlines the huge challenge for the environmental justice movement in US in spanning the gap between the small geographical scales at which problems are repeated to much larger scales where they can be addressed politically. The ability to shift across scales is, thus, important to the success of social movements (Williams 1999).

The structures of power have a huge influence on whether social movements can bring about change. If coalitions, among powerful bureaucrats, influential individuals and politicians are dynamic then there is a possibility of assessments and protests can alter the hierarchical structures, but if not then most of the re-arrangements are likely to be confined to shufflings within levels. In the Thai case the 1992 military coup of General Suchinda, followed by massive broad-based protests, provided the window of opportunity for many progressive changes, for example, the creation of the local government (Tambon Administration Organizations) in 1995 and a new "decentralizing" and "good governance" constitution of 1997 and a "community-oriented" Eighth

National Plan (1997-2001). The drafting process for the constitution was headed by Anand Panyarachun who promised the charter would “return power to the people”. Not surprisingly it was strongly opposed by the structures of power before it was passed, and later, by less direct resistance, stalling and back-tracking.

Against these changes in formal procedures, some of the realities of Thai politics at the time need to be highlighted (e.g. McVey 2000; Phongpaichit & Piriyaungsan 1996). For example, Phongpaichit & Baker (1998:250) estimated that 20-30 billion baht was spent in the 1996 election campaign – more than a US presidential campaign – mostly for direct vote buying. The seven party coalition was dubbed by the Thai press as the “7-Eleven government” after a franchise chain of convenience stores, as they were open for business 24 hours a day. Banharn Silpa-archa the secretary of Chat Thai party and then PM was known to the public and press as the “walking ATM”. His government eventually went down over two no-confidence motions over corruption, bribery and accusations over unusual wealth.

Various mechanisms to improve the accountability of elected officials have come into force in recent decades (McCargo 2002). The 2001 election, the first under the 1997 constitution, saw the entry of the telecommunications business tycoon, Thaksin Shinawatra as the Prime Minister, built around a new “Thai Rak Thai” party literally buying out better candidates from other parties. The landslide victory as a result of what was one of the first truly professional electoral campaigns with clear populist policies has let the PM adopt a very authoritarian approach to many issues including those related to water. The government, for example, was able to make a deal with the Assembly of the Poor protesters over re-opening the sluice gates of the Pak Mun dam, with the PM saying this... “was the end of the issue – the final decision (check words)”. On the other hand, the PM has come out strongly in favour of the construction of dams in the Upper Salween, presumably strategically positioning the government for favourable relations with China as various bilateral free-trade agreements were in the process of being negotiated or coming into force.

Swyngedouw & Baeten (2001) expose a more insidious process as cities become successful in inter-urban competition and become embedded in larger international networks of power through globalization. The elites of these cities are no longer as strongly committed to place and so are less a part of local institutions and politics. Without their involvement effective local environmental governance and social development becomes more difficult. Politics of scale becomes a battle over links to influential individuals.

What matters for environmental management is how these scale shifts result in re-distribution of power over natural resources, whether directly affecting access, or controlling decision-making or access to other essential entitlements. Thus, in the case of the past century in forest policies in Thailand have shifted formal control centrally to the state and its forest management agency. Rhetoric and arguments about national security interests, watershed “integrity” are inherently scalar and aimed at supporting lowland interests.

The capacity of states to circumscribe how scale is represented, whether through policies, laws or media campaigns, and, if necessary, reinforced through threats of force, has most of the time far exceeded those of other actors working at more local scales. Higher levels win, and, winning shifts values more and more in the direction of the higher, state-like scales (Morrill 1999). The greater power of larger places and higher levels has several underlying reasons (after Morrill 1999), including: the dependence of local areas on other places; mobilization capacity of interest groups at higher levels; the heterogeneity of interests and attitudes across local areas; and the dominance of national mass media. Thai language press is relatively open and dynamic, but often fails to distinguish commentary from news (McCargo 2000). Papers like Thai Rath and the Matichon are thus often filled with articles by partisan columnists and insiders hoping to influence political debate. Critical analysis of “releases” by government officials remain rare.

The conventional justification for water and watershed management by the Thai state is that coordination and control is needed to ensure supply and fair allocation. Local management, it is argued, is too complex and prone to vested interests to be effective. Smaller governance units are less accountable. The appropriate levels are, therefore, mostly large, national or at least major river basins where these lie within the country. For multinational basins like the Mekong and Salween, national strategic and development considerations must come first. Administration and management scales should match.

### **5.3 Politics of networks and collective action**

These arguments have been strongly challenged and resisted over the past two decades with respect to water by various non-governmental groups.

Community-based organizations, except when in the very headwaters, typically do not coincide with physical hydrological units. In catchments with significant competition and conflict over water resources, watershed networks may form. Their very existence is a claim that a local scale of management is needed: perhaps in addition to, not just instead of, other levels.

Wittayapak & Dearden (1999) study of four community-based watershed management regimes of differing spatial extent, ranging from 70 to more than 25,000 hectares, suggests as anticipated from other studies of common pool resources (e.g. Ostrom), that management of smaller watersheds with fewer users and clearer boundaries was more effective. Their study is important in another way in that it shows how local communities can create management structures in response to failing state-level management even without a formal authorizing framework- the watersheds are legally state property, but treated by the populations as communal property.

The focus on upland farming as a problem to water resources management reflects the structures of power in northern Thailand: lowland irrigators have much greater clout and influence than Karen and other ethnic minority counterparts cultivating in the uplands (Laungaramsri, 2002). To be more effective in lobbying state, they have had to, from time-to-time, form coalitions of networks, or join more heterogeneous "movements". It is as if a certain scale threshold, as a magnitude or extent, is required before it can appear on the national policy agenda. In northern Thailand various watershed groups have formed coalition or network of networks to tackle the government over watershed policies (Pratuang 1996; Laungaramsri 2002). The series of protests organized under the umbrella of the Assembly of the Poor, starting out of the struggles against the Pak Mun dam in northeast Thailand in 1995, and culminating in long-term protests in Bangkok by multiple groups, represent one of the more spectacular examples in Thai political history (Missingham 2003).

Sneddon (2002) analysis of the evolution of co-management the Nam Phong river basin in northeast Thailand is one of the few in this region to explicitly consider scale issues. We will examine this case in more detail. Co-management where power is shared between government agencies and community-based managers is explicitly a cross-scale arrangement. In the case of river basin management a key issue is setting the boundaries as jurisdictional boundaries of provinces and state agencies rarely correspond fully with the basins. Water resources development in the Nam Phong river basin began in earnest with the 1966 Ubolratana Dam, as part of several decades of large-scale hydroelectric and irrigation schemes for the northeast of Thailand. Ecological problems and social conflicts created by large projects has resulted in a diversity of conflicts between the state and communities across the region (Hirsch 1996; Sneddon 2002; Missingham 2003).

The Nam Phong Multipurpose Project was launched by the Mekong Committee in 1964 with the aim of supplying electricity, flood control services and irrigation development. It was promoted by the Thai state as a key step in its northeast regional development strategy and by the committee as an international project with an eye towards future transformation of the lower Mekong basin (Sneddon 2002). Changes to the flood regime and the unanticipated problems of immigration into the reservoir of poor families to capitalize on new fisheries, led to an impact assessment, the Nam Phong Environmental Management Research Project, being launched in 1976, a decade after the first major dam was completed. The assessment, carried out in three phases, covered basic data gathering on water and fisheries resources and socio-economic impacts. The final phase prepared a modeling tool to support the proposed basin management regime. The model was never implemented and the management regime abandoned soon after. Lack of coordination among various state agencies was cited as a key reason for failure. The first attempt at introducing a mechanism for handling cross-scale politics had failed. Serious incidences of water pollution from pulp and sugar factories in 1992 triggered another round of assessment activities, action plans, calls for compensation, monitoring schemes, and renewed efforts towards co-management.

One of the remaining challenges to co-management is that although the arena conflict is framed at the scale of the basin, many of the key actors are impacted and operate at other, and different, scales. The Phoenix pulp mill for example draws on eucalyptus plantations grown in a much a

wider area around Khon Kaen, is planning on using material from plantations in Laos, and exports its products. For state agencies the Nam Phong Basin is a small piece in their national vision. Even household-level producers within basin are affected and depend on altered ecosystem services in different ways. Local community organizations that have confronted industry and the state have largely focused their actions at local authorities, but occasionally used national media and links to Bangkok-based NGOs to “jump scales” (Sneddon 2002). Phoenix and state officials adopt the argument that benefits at larger scale exceed the small, local, externalities of pollution. Sneddon (2002) aptly concludes that “*questions of scale and the state go to the heart of understanding water conflicts*”.

Although it may be politically expedient to form alliances with other group or international actors there are also drawbacks. Typically, international organizations that have spread activities to developing countries, argue implicitly or explicitly that the existence of these activities imply local interests are represented. In practice, of course there are often huge gaps between the aims of these organizations, the opportunistic local allies they have entrained, and diverse local wants and needs.

For dam projects a typical asymmetry is that those areas benefiting and paying are not the same place or people (Beekman 2002). This immediately creates the need for negotiation and compensation which is not always forthcoming easily, and hence conflict arises. Dams transform water resources, re-scaling services in a profound way, making them available to different user groups and changing ecological processes. A process, Beekman, appropriately, likens to the export of land and water. Over the last two decades, the coalitions of interest in favour of large scale water resource development in Thailand, for example various schemes for inter-basin transfers, have presumed in their analysis and justifications that, negative, large scale, ecosystem impacts are relatively small compared to the benefits.

Social networks provide the links that can both reinforce socially constructed scales as well as destroy them. Building and maintain trust among key actors in governance system (that oversees and decides about management, and what “assessments” or other knowledge input to use) is mediated through institutions and social networks. Weak linkages across scales of politics may be there for a reason: to hinder bottom-up feedback on government policies. Without institutional mechanisms of downward accountability or feedback social networks may be critical for “jumping across scales”. Strong one-way links of top-down, command-and-control, style offer even less scope for dialogue and alternative representations. Highly asymmetric power relations invariably distort communications (“there is no problem with the dam”, or, “upland farming cause droughts”), public perceptions about environmental management problems, and who is included or excluded in decision-making about those issues. It is the one of the responsibilities of science and research to expose these distortions, not least of which, those arising within their own practices.

## **6 Accepting complexity**

The concept of a “politics of scale” is a useful metaphor for understanding some features of the politics of environmental management and assessment. When attention is given to spatial scale and issues of resolution, as a process of inclusion or exclusion, the multiple interests present and the scales at which they operate become more visible. If attention is also focussed on temporal scales, for example, the period and resolution over which water supply and demand is assessed, variability, and uncertainties in the resource use and demand can be made more explicit. It is the existence of cross-scale interactions, however, that ultimately add profound layer of complexity that will confound simplistic or overly-narrow attempts at environmental planning and control. Policies that target changes at particular scale may create undesirable or unjust side-effects at other scales, especially if cross-scale interactions in the ecological system are strong.

Accepting environmental assessment and management occurs in real world that is complex should make us wary scale, and assumptions that methods will simply scale-up (or down). But: *Can cross-scale interactions be harnessed if they are strongly subject to politics?* Critical questions to pose I think are: Do the processes of dialogues, negotiations and decision-making allow for interests at various scales to be considered jointly as well as diversity interests within scales? Is their both upward and downward accountability? Are responsibilities and roles assigned to the lowest possible levels, that is, is a principle of subsidiarity adopted? If not, why not?

The nine-point plan under the National Water Policy and Vision of the Royal Irrigation Department of Thailand includes completing the draft Water Act, a commitment to local participation in irrigation management and the introduction of national and river basin organizations with supporting legal framework (Budhaka et al. 2003). Although the framework and Act are not yet in place the few organizations already in existence have memberships highly skewed towards government agencies. For example representatives from government outnumbered farmers 10:1 in the upper and lower ping water basin organizations (Molle 2002; refs). Some form of recognition for smaller scale Water User Organizations are also being considered (ref?).

It is likely that some such hierarchical structure is necessary if water rights are to be successfully introduced. Given the complexities and challenges of establishing such a system across the country, maintaining flexibility at more local scales will be crucial, as will allowing time for other governance processes to mature – otherwise participation will be weak and conflicts and compliance problems likely to be exacerbated. Completely formalizing the system will be hard. Molle et al. (2001a), for example, recognizes six distinct levels of water allocation in the Chao Phraya, from the basin level (upper, middle, lower) through to irrigation projects and down to the individual ditch level.

Attempts at large-scale comprehensive urban planning regularly fail outright or made their inhabitants miserable. On this basis Scott (1998) suggests that development may need to be guided by more modest concepts like: taking small steps, favoring reversibility, planning for surprise, and plan on human inventiveness. Ideas compatible with views of ecologists taking a complex adaptive system view of human-society interactions (e.g. Gunderson & Holling 2003; Berkes et al. 2003).

There are, however, limits to the metaphor. Not all of the diversity among places fits neatly into the ordering from small to big that scale thinking implies. Important heterogeneity exists within levels (or scales). Farmers are diverse in their values, interesting and understanding. People are innovative and capable of foresight, allowing them to (sometimes) strategically jump scales.

< self-criticism and limitations of the metaphor and mechanisms.....>

Ultimately the “politics of scale” will probably be treated as a myth or an over-simplistic methaphor, but for now it still seems to have some utility of probing the way we seek to acquire and apply knowledge to environmental management.

These considerations suggest that a common objective might be building adaptive capacity at several scales in the social-ecological system, while acknowledging a diversity of other, sometimes, conflicting objectives about other aspects of the system.

The capacity to make use of scale varies greatly between stakeholders (Swyngedouw 1997a). One of the objectives of intervention, may therefore be, enabling the “*scale capabilities*” of the less powerful (Rankin 2003).

The WCD Process brought to the for trends already underway in the World Bank highlighting the importance of public participation in the procedures for construction of large dams. The favoured term “gaining public acceptance” underlines how, the problem is still seen as, at least partly, one of marketing, rather than a genuine analysis of options including the option of no construction at all. Residuals of this line of reasoning persists in Beekman (2002) argument about the need for a paradigm shift from decisions and plans based almost entirely on engineering criteria to analyses and decisions where participation to reach consensus on projects is central. His call for public participation not only in initial option assessment, but also administration and allocation as an emerging human right is echoed by others (refs). Meaningful participation must include being able to potentially alter decisions not just “opportunities” to listen to the sales pitch.

There is a huge academic and populist literature about the benefits of participatory watershed management. While applauding the success of growth of social movements and strengthening of civil society we could also point to the repeated failure of such movements to follow-up with actions at larger scales (in administrative scale) and follow-through (in time), to the points of legislation and then implementation by the bureaucracy. Processes also often fail to acknowledge the diversity of interests and power relations that constitute the core of politics of scale.

An exception, reflecting changes in governance, availability of information technology and attitudes towards wider social networks, opponents of large dam projects in Thailand and the Mekong Region have been quick to latch onto larger scale assessments and institutional processes. The World Commission on Dams (2000) report provided guidelines for negotiation approach at the appraisal stage, it could be argued, has had an impact on the Pak Mun dam politics as it was one of the 8 highlighted case studies in the report. On the one hand it drove strong fissures within the Thai bureaucracy leading some parts to completely reject the report as overly green (?), but on the other hand it coincided with (helped push forward?) negotiated agreement between the new Thai government and the Assembly of the Poor to resolve the long-running protests over the Pak Mun Dam (Simon, 2000; cite?).

The existence of multiple ways of framing environmental goods and bads mean that ultimately it is the quality of the governance process which will determine whether scientific assessments will be helpful, and management can be effective, in pursuing society's goals.

At the same time, if these goals include sustainability and resilience of ecosystems, as I think they should, then the explicit strategy should be to be thinking multi-scale and multi-level from the outset, but with the expectation that earlier choices will have to be modified over time for both ecological and social reasons. The experts invariably get it wrong, but at least they should be able to tell the rest of us why.

## Literature Cited

- Alford D. 1994. Water budgets and water regions: planning and managing water resources development in Thailand. Thailand Development Research Institute Quarterly 9(4):14 -23.
- Amoros C, Bornette G. 2002. Connectivity and biocomplexity in waterbodies of riverine floodplains. Freshwater Biology 47: 761 -776.
- Arbhabharama A, Phantumvanit D, Elkington J. 1988. Thailand natural resources profile. Oxford University Press: New York, 431p.
- Baeten, G. 2000. The tragedy of the highway: empowerment, disempowerment and the politics of sustainability discourses and practices. European Planning Studies 8(1):69-86.
- Beekman GB. 2002. Social change and water resource planning and development. Water Resources Development 18(1):183-195.
- Berkes, F., J. Colding and C. Folke, editors. 2003. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* Cambridge: Cambridge University Press.
- Budhaka B, Sirkajorn M, Boonkird V. 2003. Thailand country report on investment in water. [Accessed on-line , 5-Jan-04 at: www.]
- Christensen SR, Boon-Long A. 1994. Institutional Problems in Thai Water Management. May 1994, 54 p. Thailand Development Research Institute NR37.
- Cox KR. 1998. Spaces of dependence, spaces of engagement and the politics of scale, or: looking for local politics. Political Geography 17:1-23.
- (Cash et al. PNAS)
- Delaney, D. and Leitner, H. (1997) The political construction of scale. *Political Geograhy* **16**, 93–97.
- Dixon C. 1999. The Thai economy: uneven development and internationalization. Routledge: London. 316pp,
- Dudgeon D. 2002. Large-scale hydrological changes in tropical Asia: prospects for riverine biodiversity. BioScience 50(9): 793 -806.

- Forsyth T. 1999. Questioning the impacts of shifting cultivation. *Watershed* 5:23-29.
- Forsyth T. 2000. Environmental social movements in Thailand: how important is class? *American Journal of Social Sciences* 29(1):35-51.
- (Gibson & Clark?)
- Gunderson LH, Holling CS. 2003. (Eds) *Panarchy: understanding transformation in human and natural systems*. Island Press: Washington DC.
- Holling CS, Gunderson LH, Peterson GD. 2003. Sustainability and panarcies. Pages 63-102 in Gunderson LH, Holling CS (Eds). *Panarchy: understanding transformation in human and natural systems*. Island Press: Washington DC.
- Kasemir B, Jäger J, Jaeger CC, Gardner T. 2003. (Eds) *Public participation in sustainability science. A handbook*. Cambridge University Press: Cambridge.
- Keller A, Keller J, Seckler D. 1996. *Integrated water resources systems: theory and policy implications*. International Water Management Institute, Research Report No. 3. IWMI: Colombo, 15p.
- Koppel. B. 1988. Ripples and trickles: impact assessment and policy analysis in Asia. *Policy Studies Review* 116-125.
- Kurtz HE. 2003. Scale frames and counter-scale frames: constructing the problem of environmental injustice. *Political Geography* 22:887-916.
- Laungaramsri (Pinkaw). 2000. The ambiguity of "watershed": the politics of people and conservation in Northern Thailand. *Sojourn* 15(1):52-75.
- Laungaramsri, P. 2002. *Redefining nature: Karen ecological knowledge and the challenge to the modern conservation paradigm*. Earthworm Books: Chennai.
- Lebel 2004 (in press). *Nobody knows best.... International Environmental Agreements*.
- Leitner 2003. (ref?)
- McCargo D. 2000. *Politics and the press in Thailand: media machinations*. Garuda Press: Bangkok.
- McCargo D. 2002. (Ed) *Reforming Thai politics*. Nordic Institute of Asian Studies: Copenhagen.
- McVey R. 2000. (Ed). *Money and power in provincial Thailand*. Institute of Southeast Asian Studies, Singapore and Silkworm Books: Chiang Mai.
- Millennium Ecosystem Assessment 2003. *Ecosystems and human well-being: a framework for assessment*. Island Press: Washington DC.
- Kaosa-ard, M. 2001. *Water resources management policy directions in Thailand*. Bangkok, Thailand Development Research Institute, 758p.
- Missingham BD. 2003. *The Assembly of the Poor in Thailand: from local struggles to national protest movement*. Silkworm Books: Chiang Mai.
- Mitchell. M. 1996. The political economy of Mekong Basin development. Pages 71-89 in Hirsch P, Warren C. (Eds). *The politics of environment in Southeast Asia: resources and resistance*. Routledge: London.
- Molle F. 2001. *Water pricing in Thailand: theory and practice*. DORAS project Research Report No. 7. Kasetsart University: Bangkok. 78p.

- Molle F. 2002. Economic tools for water demand management in Thailand: conventional wisdom and the real world. Pages 209-223 in Brennan D (Ed). Water Policy Reform: Lessons from Asia and Australia. Proceedings of an International Workshop held in Bangkok, Thailand, 8 – 9 June 2001. ACIAR Proceedings No 106. Australian Centre for International Agricultural Research: Canberra, 322p.
- Morrill R. 1999. Inequalities of power, costs and benefits across geographic scales: the future uses of the Hanford reservation. *Political Geography* 18:1-23.
- Pendras M. 2002. From local consciousness to global change: asserting power at the local scale. *International Journal of Urban and Regional Research*. 26(4):823-33.
- Phongpaichit P, Baker C. 1998. Thailand's boom and bust. Silkworm Books: Chiang Mai.
- Phongpaichit P, Piriyaangsan S. 1996. Corruption and democracy in Thailand. 2<sup>nd</sup> Edition. Silkworm Books: Chiang Mai.
- Pratuang Narintarangkul Na Ayudhya. 1996. Community forestry and watershed networks in Northern Thailand. Pages 116-146 in Hirsch P. (Ed) Seeing forests for trees: environment and environmentalism in Thailand. Silkworm Books: Chiang Mai, Thailand.
- Pritchard L, Jr., Sanderson SE. 2003. The dynamics of political discourse in seeking sustainability. Pages 147-169 in Gunderson LH, Holling CS (Eds). Panarchy: understanding transformation in human and natural systems. Island Press: Washington DC.
- Rankin KN. 2003 Anthropologies and geographies of globalization. *Progress in Human Geography* 27(6): 708-734.
- Richardson T, Jensen OB. 2003. Linking discourse and space: towards a cultural sociology of space in analyzing spatial policy discourses. *Urban Studies* 40:7-22.
- Rigg J. 1997. Southeast Asia: the human landscape of modernization and development. Routledge: London.
- Sachs, W. 1992 One world. Pages 116-131 in Sachs W (Ed.) *The Development Dictionary. A Guide to Knowledge as Power*. London: Zed Books.
- Scott JC. 1998. Seeing like a state: how certain schemes to improve the human condition have failed. Yale University Press: New Haven.
- Simon, D. 2000: Viewpoint: dammed development? *Third World Planning Review* 22(2), iii-ix.
- Simon D. 2003. Dilemmas of development and the environment in a globalizing world: theory, policy and praxis. *Progress in Development Studies* 3:5-41.
- Sitanon Jesdapipat and Siriporn Kiratikarnkul. Surrogate Pricing for Water: The Case of Micro Hydro-Electricity Cooperatives in Northern Thailand . EEPSEA Working Paper: Singapore.
- Sneddon C. 2002. Water conflicts and river basins: the contradictions of comanagement and scale in Northeast Thailand. *Society and Natural Resources* 15:725-741.
- Sneddon C, Harris L, Dimitrov R. 2002. Contested waters; conflict, scale and sustainability in aquatic socioecological systems. *Society and Natural Resources* 15:663-675.
- Social Learning Group. 2001. Learning to manage global environmental risks. Vol 2. A functional analysis of social responses to climate change, ozone depletion and acid rain. MIT Press: Cambridge.

Swyngedouw, E. 1997a. Neither global nor local. 'Glocalization' and the politics of scale, in K. COX (Ed.) *Spaces of Globalization: Reasserting the Power the Local*, pp. 137–166. New York: Guildford. {Cited in Baeter and several others}

Swyngedouw, E. 1997b. Excluding the Other: the production of scale and scaled politics, in R. LEE and J. WILLS (Eds) *Geographies of Economies*. London: E. Arnold, pp. 171–180. {cited in Baeter}

Swyngedouw E, Baeten G. 2001. Scaling the city: the political economy of "glocal" development – Brussels' Conundrum. *European Planning Studies* 9(7): 827 -849.

Tadem TSE. 2002. Thai social movement and the anti-ADB campaign. *Journal of Contemporary Asia* 33: 377-398.

Towers, G. (2000). Applying the political geography of scale: grassroots strategies and environmental justice. *Professional Geographer*, 52(1), 23–36.

Vankerks... Traditional irrigation systems in the north of Thailand.... Chiang Mai University: Chiang Mai....

Walker A. 2003. Agricultural transformation and the politics of hydrology in northern Thailand. *Development and Change* 34(5):941-964.

Wittayapak C., Dearden P, 1999. Decision-making arrangements in community-based watershed management in Northern Thailand. *Society and Natural Resources* 12:673-691.

Williams RW. 1999. Environmental injustice in America and its politics of scale. *Political Geography* 18:49-73.

Young... (Fit/Interplay)

Zimmerer KS. 2000. Rescaling irrigation in Latin America: the cultural images and political ecology of water resources. *Ecumene* 7(2):150-175.

### **To Cite / Citable!**

Alford D. 1992. Streamflow and sediment transport from mountain watersheds of the Chao Phraya Basin, Northern Thailand: a reconnaissance study. *Mountain Research and Development* 12:257-268.

Forsyth T. 1996. Science, myth and knowledge: testing Himalayan environmental degradation in Thailand. *Geoforum* 27:375-392.

Towards Ecological Recovery and Regional Alliance (TERRA). 1998. Forum. Conflict or resolution? People and forests in northern Thailand. *Watershed* Vol 4(1): 10-28.

Hirsch P. 1998. Dams, resources and the politics of environment in mainland Southeast Asia. Pages 55-70 in Hirsch P, Warren C. (eds). *The politics of environment in southeast Asia: resources and resistance*. Routledge: London.

Kultida Samabuddhi. *Eco-systems said to be under threat*. 24 Sep 03. Bangkok Post.

Vandergeest . Territorialization.

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