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Getting the measure of ecosystem services: a social–ecological approach

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Getting the measure of ecosystem services: a social–ecological approach

Belinda Reyers[1,2*], Reinette Biggs[2,3], Graeme S Cumming[4], Thomas Elmqvist[5], Adam P Hejnowicz[6], and Stephen Polasky[7]

Despite growing interest and investment in ecosystem services across global science and policy arenas, it remains unclear how ecosystem services – and particularly changes in those services – should be measured. The social and ecological factors, and their interactions, that create and alter ecosystem services are inherently complex. Measuring and managing ecosystem services requires a sophisticated systems-based approach that accounts for how these services are generated by interconnected social–ecological systems (SES), how different services interact with each other, and how changes in the total bundle of services influence human well-being (HWB). Furthermore, there is a need to understand how changes in HWB feedback and affect the generation of ecosystem services. Here, we outline an SES-based approach for measuring ecosystem services and explore its value for setting policy targets, developing indicators, and establishing monitoring and assessment programs.

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Galileo once wrote, "Count what is countable, measure what is measurable, and what is not measurable, make measurable", a dictum that has set the course for empirical science across the disciplines. This axiom has recently become central to sustainability science and policy, where greater recognition of the world's environmental and development challenges has fostered efforts to make complex concepts such as biodiversity and poverty "measurable", to set policy targets and measure progress in reaching those targets (eg targets associated with the Convention on Biological Diversity [CBD] and the United Nations Millennium Development Goals).

Although there have been advances toward making these multidimensional policy targets measurable, much work remains to be done (eg Attaran 2005; McArthur *et al.* 2005; Walpole *et al.* 2009). In principle, there are two major obstacles impeding further progress: (1) inadequate data with which to measure changes in biodiversity, poverty, and other components relevant to policy targets (Scholes *et al.* 2008), and (2) the general immeasurability of the policy target of interest, often on account of poorly understood, unquantified, and complex concepts (eg biodiversity, poverty, and well-being). In the rush to address data inadequacy issues, the latter has been largely overlooked, resulting in a plethora of measures and indicators (based on existing data) that frequently fall short of their intended purpose (Mace and Baillie 2007).

As ecosystem services increasingly take center stage in the global conservation and development arenas, a proliferation of measures (Egoh *et al.* 2007), values (Liu *et al.* 2010), and indicators (Layke *et al.* 2012) has emerged (Panel 1). However, scant attention has been paid to what it is we should be measuring. Ecosystem services represent a complex and diverse concept, with broad and often conflicting definitions (see Nahlik *et al.* [2012] for a review); this has inhibited the development of concise operational definitions and measures (Reyers *et al.* 2012), as well as coherent and comprehensive policy objectives and targets (Perrings *et al.* 2010, 2011).

In response, several frameworks aimed at advancing the operational understanding of ecosystem services have been developed (eg Fisher and Turner 2008; de Groot *et al.* 2010; Haines-Young and Potschin 2010; Rounsevell *et*

In a nutshell:

- When measuring ecosystem services, it is important to account for the social and ecological factors, and their interactions, involved in service production
- Ecosystem service measurement should capture the consequences of changes in social and ecological factors for multiple services, their benefit flows to different beneficiaries, and corresponding feedbacks
- If ecosystem services are measured through the use of a social–ecological systems-based approach, it is possible to develop improved policy targets and indicators capable of accounting for the dynamic and complex nature of ecosystem services

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Panel 1. Selected definitions

Several related terms are used in the establishment and monitoring of policy targets. The term *measure* (or measurement) is used to refer to the actual assignment of a number to a state, quantity, or process derived from observations or monitoring. For example, bird counts are a measure derived from an observation. An *indicator* is defined as a measure (or index made up of several measures) that conveys information about more than itself and serves as an indication of a feature of interest. For instance, bird counts compared over time exhibit a trend that can be used as an indicator of the success of conservation actions for birds. Similarly, counts across different vertebrate groups worldwide can be combined into a composite *index* to form an indicator of the success of conservation actions for species. The Living Planet Index is an example of such a broad indicator. Indicators are typically used for a specific purpose (eg to provide a policy maker with information about progress toward a target). *Targets* refer broadly to goals or objectives. The CBD has several targets in its new strategy, including Target 14, which states that: "By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable".

al. 2010; Mace *et al.* 2011). These frameworks have helped to clarify ecosystem service definitions and classifications, especially in the context of the economic valuation of single services. However, the complex, interconnected, dynamic nature of ecosystem services has so far prevented researchers from measuring them in a way that clarifies the consequences of ecosystem service change for human well-being (HWB), which has impeded informing the complex trade-offs associated with sustainability-related policy and management decisions.

We believe that what is required is an evolution of these frameworks and the current simplistic measures of ecosystem services, which dominate policy formulation, toward a framework and a set of measures that make explicit the dynamic linkages between the social and ecological structures and processes (hereafter "factors") associated with ecosystem services, HWB, and their interactions (Web-Panel 1). Although such an integrated framework has yet to be developed, we suggest that advances in our understanding of coupled social–ecological systems (SES; Berkes *et al.* 2003) will promote its creation. An SES-based approach adopts a more integrated view of the social and ecological factors related to ecosystem services and HWB, including non-linear feedbacks, trade-offs, and interactions associated with service provision. Here, we explore how a better understanding of SES can help to improve current and develop new measurements of ecosystem services, as well as contributing to more explicit policy targets.

An SES approach for ecosystem services measurement and management

An SES approach to ecosystem services measurement (Figure 1) highlights the importance of measuring: (1) the social and ecological factors that produce ecosystem services, (2) the bundles of services produced and their benefit flows, (3) the changes in HWB and their influence on SES management, and (4) the changes in SES management and their effect on (1). Below, we explore each of these stages.

Social–ecological production of ecosystem services

Current practice in ecosystem service-related studies focuses on the concept of ecological production functions, which combine a set of biophysical variables (eg soil type, tree cover) to model the production of an ecosystem service. This practice emphasizes the ecological factors associated with ecosystem service production, and often excludes the social factors also involved. The studies that include social factors tend to do so after service production, as measures of use or value (eg Nahlik *et al.* 2012). An SES approach broadens the concept of ecological production functions by recognizing that in the human-dominated environment, social factors such as skills, management regimes, and technology are also involved in ecosystem services production (Walker and Salt 2006; Easdale and Aguiar 2012) – a fact that, while broadly understood, is currently not apparent in ecosystem services frameworks. For example, to model the production of cereal crops, one needs to incorporate biophysical conditions of soil and rainfall, as well as the application of technologies like irrigation and fertilizer, plus the skills of the farmer. Even beyond technologically enhanced provisioning services, there are few services that do not involve social factors in their production (eg built infrastructure for water services, societal capacity to manage and govern communal resource productivity, or beneficial species management and enhancement; Figure 2). Cultural services have particularly strong social factors involved in their production (eg recreational infrastructure and preferences, sacred site traditions and management) and have for the most part not been successfully modeled using ecological production functions (Daniel *et al.* 2012).

Land use – which reflects the interactions between the biophysical characteristics of the land and the human management thereof – provides a relatively uncomplicated starting point for exploring these social–ecological production functions and is already included in several production functions currently in use (eg flood regulation and sediment retention; Kareiva *et al.* 2011). However, for many ecosystem services, more work is required to identify the social factors, and their interactions with ecological factors, needed to develop social–ecological production functions that can satisfactorily model the production of these services.

Bundles of services and benefit flows

As with many existing ecosystem services frameworks, an SES approach highlights the importance of moving

beyond measuring the supply of services provided by an area (eg crop production, water regulation) to metrics that provide an indication of the actual benefits gained by people (eg drinking water, food, flood protection). These include economic, social, and cultural benefits, which are often referred to as goods or final services in other frameworks (see Nahlik *et al.* 2012). Measuring benefits requires an in-depth understanding of SES to identify how the benefits from ecosystem services are distributed to, or accessed by, different groups of beneficiaries (Cowling *et al.* 2008). Despite their importance in ecosystem service definitions and frameworks, ecosystem service benefits, as well as their flow to beneficiaries, remain a poorly understood and quantified component of measurement and monitoring programs (Carpenter *et al.* 2009).

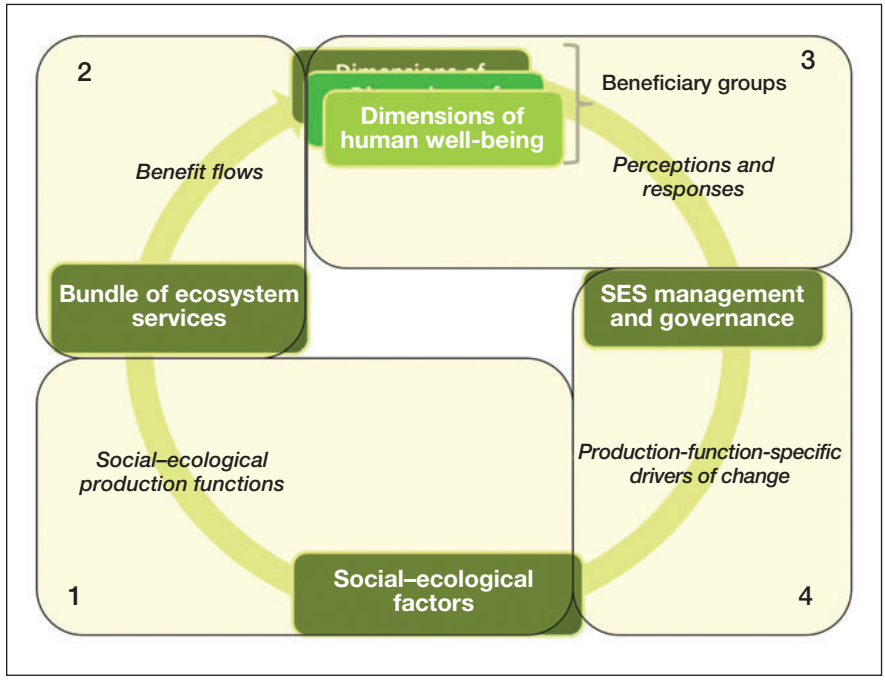

Figure 1. *An SES approach to identifying social–ecological factors and interactions is needed to measure and manage ecosystem services and HWB. Such an approach highlights the importance of measuring: (1) the social–ecological factors involved in the production of ecosystem services, (2) the benefits that flow from bundles of interacting ecosystem services, (3) the impacts of these benefit flows on specific dimensions of HWB across beneficiary groups and the impact of these changes on SES management and governance, and (4) the influence of management and governance on the SES factors that underpin ecosystem services.*

In contrast to existing frameworks, an SES approach aims to identify the benefits associated with a bundle of interacting services and to see how those benefits flow to different beneficiary groups (Daw *et al.* 2011; Syrbe and Walz 2012). Few existing frameworks focus on evaluating the consequences of a particular intervention on the total bundle of ecosystem services, although services interact with one another and decisions to enhance a particular service will affect the type, mix, and magnitude of other services provided by an SES (Bennett *et al.* 2009). An SES approach emphasizes that (1) understanding changes in the total bundle is the only way to assess the consequences of changes in SES for HWB and whether and how greatly changes in ecosystem services matter to people, and (2) a meaningful assessment of trade-offs between services requires an evaluation of the net benefit flow changes and their consequences for HWB, rather than simply an assessment of the changes in specific services.

Human well-being – consequences and responses

Many ecosystem service programs only measure the benefits provided by services. However, understanding the impacts of these benefits on HWB across different groups of beneficiaries is central to most policy and management choices. Like ecosystem services, HWB is a complex and multivariate concept, dependent not only on ecosystem services but also on a multitude of other ecological and social factors and their interactions. While many frameworks make the link to HWB, few have advanced our ability to measure HWB and untangle its links to ecosystem services, making current practices reliant on economic valuation or broad qualitative statements about well-being. An SES approach clarifies the need to: (1) stipulate the beneficiary groups being considered, (2) identify and measure the relevant dimensions of HWB (eg security, health), and (3) link changes in different HWB dimensions to the benefit flows from the ecosystem services bundle (Daw *et al.* 2011; Rogers *et al.* 2012).

The SES approach also highlights the need to move beyond changes in HWB to explore how these changes feed back to influence governance and policy and, consequently, SES and their services. Existing frameworks require simply monitoring the indirect drivers of change (eg sociopolitical and economic; MA 2003; TEEB 2010) or indicators of governance and management (eg protected area extent, restoration programs implemented) without an understanding of what drives these changes and what constituents of well-being are most important in motivating changes in governance and policy. A better understanding of how to achieve these changes to encourage more sustainable management of SES has been identified as a key gap in transitioning to more sustainable development trajectories (Folke and Rockström 2011; Westley *et al.* 2011). This gap in understanding will hamper progress in the learning processes that are fundamental to building resilience and addressing uncertainty in SES (Cundill *et al.* 2012). Recent frameworks for the

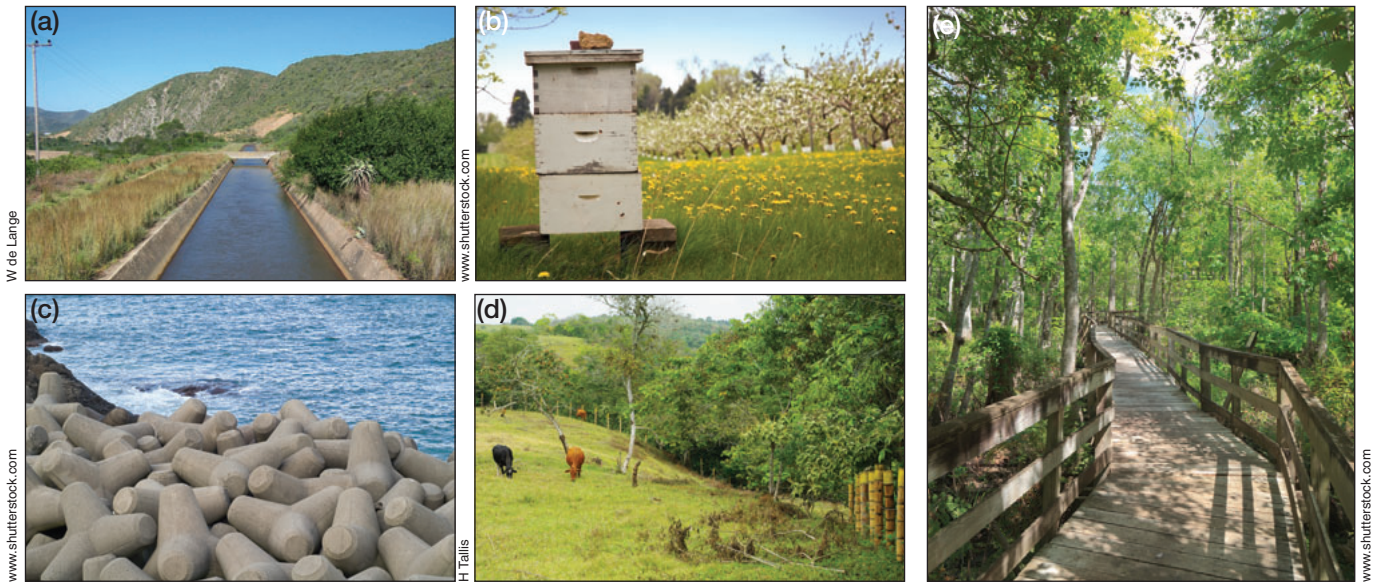

Figure 2. *Accurately modeling the production of most ecosystem services requires the inclusion of social–ecological production functions that take into account social factors underpinning ecosystem services; for example: (a) irrigation canals that deliver water for food production in dry regions, (b) beehive management for pollination and fruit production, (c) engineered infrastructure to enhance coastal protection services, (d) grazing management and fencing to protect riparian areas for water services, and (e) trail infrastructure and maintenance to enhance recreation services.*

study of SES (Berkes *et al.* 2003; Anderies *et al.* 2004; Ostrom *et al.* 2007; Chapin *et al.* 2009; Ostrom 2009) will be critical in shifting from simply tracking change to enabling change to be managed and directed.

Governing and managing social–ecological factors underpinning ecosystem services

An SES approach makes clear the need to link SES governance and management with SES changes that underpin ecosystem service generation, which is crucial in assessing the effectiveness of and suggesting ways to improve ecosystem service-related policy, decision making, and management (Folke *et al.* 2005; Carpenter *et al.* 2009). We follow Biggs *et al.* (2012) in differentiating between SES governance, which includes the social and political process of defining goals for SES management and resolving trade-offs, and SES management, which is defined as the actions taken to achieve these goals.

Many indicators of the link between SES governance and management, and the social and ecological factors underpinning ecosystem services, currently focus on drivers of change in SES (eg land-cover changes, pollutant levels). However, knowing the area of forest lost or the amount of pollutants in a river does not necessarily indicate how this translates into loss of ecosystem services or how to respond to this change. An SES approach argues that these measures of drivers must be (1) explicitly connected to changes in SES governance or management and (2) converted into measures of impacts on the social and ecological factors relevant in the production function of key ecosystem services. For example, an SES approach applied to the commonly used indicator of "increases in protected area coverage" proposes an explicit link to the policy that led to this increase as well as a link to the impacts of such an increase on the social or ecological factors (eg increases in populations of beneficial species) underpinning ecosystem services, in order to help in determining which forms of governance work in improving ecosystem services.

Application of SES learning: from intractable targets to efficient indicators

The set of policy targets proposed in the CBD's new strategic plan (www.cbd.int/sp/targets), together with existing national and international conservation and development policies, present a "minefield" of competing visions, missions, and goals for implementing agencies to select and measure progress. We suggest that the SES approach described above can be useful to these implementing agencies by providing a mechanism to (1) explore conservation and development policies and related monitoring programs; (2) identify possible gaps, conflicts, and redundancies in policy targets; and (3) assist in the deconstruction and appraisal of these complex policy targets into sets of indicators to evaluate progress.

We demonstrate an application of the third mechanism by exploring an SES approach to the development of indicators for measuring progress toward Target 14 of the CBD's current strategy (Panel 1; Figure 3). Although it is one of the few targets that acknowledge the social and ecological factors of ecosystem services, Target 14 is loosely formulated and challenging to implement. As a result, the current set of three proposed headline indicators with which to measure this target (health and well-being, biodi-

versity for food and medicine, and water security; UNEP 2011) are underdeveloped and rely on existing data without consideration of what measurements are required to assess progress.

Figure 3 demonstrates how an SES approach would identify a different set of measures; this (1) enables the distillation of this complex target into its component parts (eg beneficiary group and ecosystem services of relevance) and (2) begins to develop the necessary set of measures for evaluating progress. By focusing on one of the specified beneficiary groups in the target (vulnerable women), we can begin to critique and prioritize relevant HWB dimensions (basic materials, health, and security). These HWB dimensions can, in turn, be linked to the required ecosystem service benefit flows (domestic water, food, fuel, fiber, protection from natural disasters [eg floods], resource security). In this example, domestic water is selected as a priority benefit because of its relevance to women in poverty contexts and its links to both basic material needs and health dimensions of HWB; however, the SES approach could be applied for other identified benefit flows as well. Being explicit about the benefit (in this case, domestic water) helps to identify the essential services referred to in the target, which include water provision (quantity), water regulation (timing), and water purification (quality), as well as erosion control services. The SES approach also stresses the importance of other services in the bundle of services relevant to HWB of vulnerable women (eg crop production, fuelwood production), which are necessary for quantifying trade-offs with water services and their consequences for HWB. From the final list of relevant services, it becomes possible to list the social and ecological factors for each ecosystem service that will require measurement, as well as the governance and management interventions that enhance or degrade these factors. The list of relevant measures depicted in Figure 3 is long (and even longer when benefits beyond domestic water and additional beneficiaries are considered) and underscores the complexity of this policy target. However, the SES approach, when applied across all targets, will highlight the measures of relevance to other targets and thus help to ensure more efficient monitoring programs and indicator development. In fact, if Target 14 is properly appraised and operationalized, it could in essence replace many of the other ecosystem service-related targets, or at least align their monitoring programs.

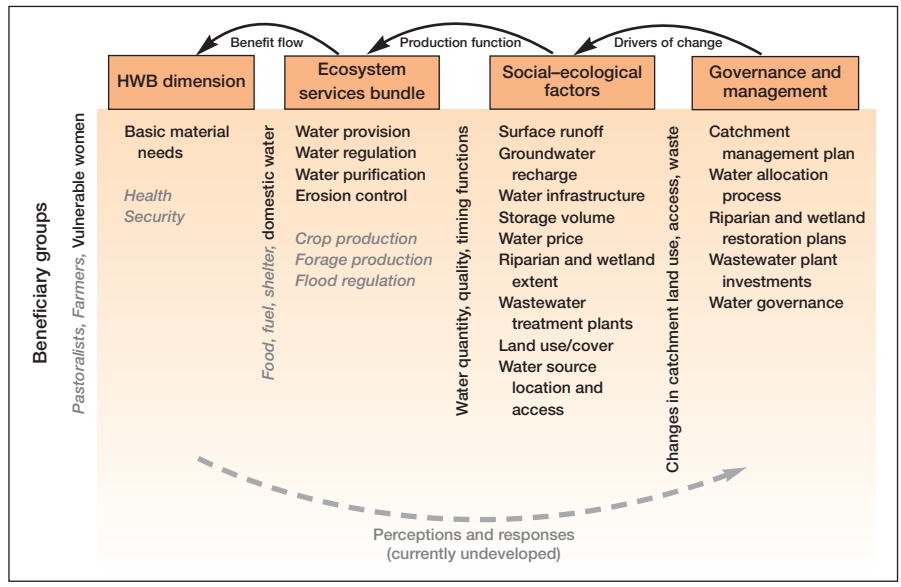

Figure 3. *Application of an SES approach to developing indicators and measures for monitoring progress toward CBD Target 14 (see Panel 1). The application starts on the left by identifying relevant HWB dimensions related to the beneficiaries identified in the target (here, vulnerable women). These dimensions include basic material needs, health, and security; a focus on the former, in turn, enables the development of a list of benefit flows relevant to material needs. From these benefits, the application takes forward domestic water and its relevant ecosystem services (related to water quantity, quality, and timing), as well as those that are co-produced by the SES and may trade off against the selected services (eg crop production, forage production). Measurements of the social–ecological factors relevant to each identified service's production function are identified. Finally, an exploration of social–ecological factors reveals management and governance interventions of relevance to the factors that require monitoring. The final link between HWB and governance and management remains uncertain and is therefore not developed in this application but could include measures of changes in attitudes to water quality or access, managers' perceptions, or national values.*

Conclusion

Considering the current limited knowledge of ecosystem services and HWB, present efforts to improve HWB through the use of ecosystem services must be "regarded as hopeful hypotheses to be tested rather than guaranteed prescriptions for success" (Carpenter *et al.* 2009). Consequently, we suggest that closer engagement with SES studies will advance our understanding of the social and ecological factors relevant to ecosystem services and HWB and will provide a more nuanced and comprehensive understanding of human–nature interactions within human-dominated environments. The strength of an SES-based approach resides in its ability to measure ecosystem services by integrating social and ecological factors, service generation, delivery, and management, as well as HWB, in a linked iterative cycle. Consequently, it provides both a theoretical and a practical set of instruments to conceptualize and understand complex SES, as well as the means to develop new targets, policy objectives, and indicators. The SES approach can assist our community in developing and testing relevant hypotheses. By learning from past successes and failures, scientists, managers, and decision makers can contribute to the

ability of an SES to adapt to and shape changes – an important component of resilience in an SES (Berkes *et al.* 2003).

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WebPanel 1. Moving toward an integrated ecosystem services framework

To support and inform the complex interactions and trade-offs associated with most ecosystem services-related policies and management decisions, we propose an integrated framework that would ideally:

(1) Connect HWB to ecosystem services as products of complex SES

(2) Elucidate dynamic linkages and rates of change

(3) Provide a route so that multiple perturbations can be investigated and understood

(4) Take into account cross-scale linkages

(5) Provide a pragmatic and relevant approach to policy formulation that can form the basis for targets to be effectively linked and monitored

(6) Inform management interventions and broader policy initiatives through its predictive capabilities

(7) Integrate conservation and development policy targets

A General Framework for Analyzing Sustainability of Social-Ecological Systems

Elinor Ostrom, *et al.*

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it can address the inherent heterogeneity in who meets whom. This application can be extended to social networks as a way to estimate the spread of disease (*30*) and the evolution of cooperation (*31*) in heterogeneous societies.

Conclusions

Networks are useful descriptors of ecological systems that can show the composition of and interactions between multiple elements. The application of networks to ecosystems provides a conceptual framework to assess the consequences of perturbations at the community level. This may serve as a first step toward a more predictive ecology in the face of global environmental change. Networks are also able to introduce heterogeneity into our previously homogeneous theories of populations, diseases, and societies. Finally, networks have allowed us to find generalities among seemingly different systems that, despite their disparate nature, may have similar processes of formation and/or similar forces acting on their architecture in order to be functional. Although we have only begun to understand how changes in the environment affect species interactions and ecosystem dynamics through analyses of simple pairwise interactions, network thinking can provide a means by which to assess key questions such as how overfishing can cause trophic cascades, or how the disruption of mutualisms may reduce the entire pollination service within a community (*25*). As the flow of ideas among seemingly unrelated fields increases (a characteristic attribute of research on complex systems), we envision the creation of more powerful models that are able to more accurately predict the responses to perturbations of food webs, a major challenge for today's ecologist.

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PERSPECTIVE

A General Framework for Analyzing Sustainability of Social-Ecological Systems

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A major problem worldwide is the potential loss of fisheries, forests, and water resources. Understanding of the processes that lead to improvements in or deterioration of natural resources is limited, because scientific disciplines use different concepts and languages to describe and explain complex social-ecological systems (SESs). Without a common framework to organize findings, isolated knowledge does not cumulate. Until recently, accepted theory has assumed that resource users will never self-organize to maintain their resources and that governments must impose solutions. Research in multiple disciplines, however, has found that some government policies accelerate resource destruction, whereas some resource users have invested their time and energy to achieve sustainability. A general framework is used to identify 10 subsystem variables that affect the likelihood of self-organization in efforts to achieve a sustainable SES.

The world is currently threatened by considerable damage to or losses of many natural resources, including fisheries, lakes, and forests, as well as experiencing major reductions in biodiversity and the threat of massive climatic change. All humanly used resources are embedded in complex, social-ecological systems (SESs). SESs are composed of multiple subsystems and internal variables within these subsystems at multiple levels analogous to organisms composed of organs, organs of tissues, tissues of cells, cells of proteins, etc. (*1*). In a complex SES, subsystems such as a resource system (e.g., a coastal fishery), resource units (lobsters), users (fishers), and governance systems (organizations and rules that govern fishing on that coast) are relatively separable but interact to produce outcomes at the SES level, which in turn feed back to affect these subsystems and their components, as well other larger or smaller SESs.

Scientific knowledge is needed to enhance efforts to sustain SESs, but the ecological and social sciences have developed independently and do not combine easily (*2*). Furthermore, scholars have tended to develop simple theoretical models to analyze aspects of resource problems and to prescribe universal solutions. For example, theoretical predictions of the destruction of natural resources due to the lack of recognized property systems have led to one-size-fits-all recommendations to impose particular policy solutions that frequently fail (*3*, *4*).

The prediction of resource collapse is supported in very large, highly valuable, open-access systems when the resource harvesters are diverse, do not communicate, and fail to develop rules and norms for managing the resource (*5*) The dire predictions, however, are not supported under conditions that enable harvesters and local leaders to self-organize effective rules to manage a resource

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or in rigorous laboratory experiments when subjects can discuss options to avoid overharvesting (*3*, *6*).

A core challenge in diagnosing why some SESs are sustainable whereas others collapse is the identification and analysis of relationships among multiple levels of these complex systems at different spatial and temporal scales (*7*–*9*). Understanding a complex whole requires knowledge about specific variables and how their component parts are related (*10*). Thus, we must learn how to dissect and harness complexity, rather than eliminate it from such systems (*11*). This process is complicated, however, because entirely different frameworks, theories, and models are used by different disciplines to analyze their parts of the complex multilevel whole. A common, classificatory framework is needed to facilitate multidisciplinary efforts toward a better understanding of complex SESs.

I present an updated version of a multilevel, nested framework for analyzing outcomes achieved in SESs (*12*). Figure 1 provides an overview of the framework, showing the relationships among four first-level core subsystems of an SES that affect each other as well as linked social, economic, and political settings and related ecosystems. The subsystems are (i) resource systems (e.g., a designated protected park encompassing a specified territory containing forested areas, wildlife, and water systems); (ii) resource units (e.g., trees, shrubs, and plants contained in the park, types of wildlife, and amount and flow of water); (iii) governance systems (e.g., the government and other organizations that manage the park, the specific rules related to the use of the park, and how these rules are made); and (iv) users (e.g., individuals who use the park in diverse ways for sustenance, recreation, or commercial purposes). Each core subsystem is made up of multiple second-level variables (e.g., size of a resource system, mobility of a resource unit, level of governance, users' knowledge of the resource system) (Table 1), which are further composed of deeper-level variables .

This framework helps to identify relevant variables for studying a single focal SES, such as the lobster fishery on the Maine coast and the fishers who rely on it (*13*). It also provides a common set of variables for organizing studies of similar SESs such as the lakes in northern Wisconsin (e.g., why are the pollution levels in some lakes worse than in others?) (*14*), forests around the world (e.g., why do some locally managed forests thrive better than government-protected forests?) (*15*), or water institutions (e.g., what factors affect the likelihood that farmers will effectively manage irrigation systems?) (*16*). Without a framework to organize relevant variables identified in theories and empirical research, isolated knowledge acquired from studies of diverse resource systems in different countries by biophysical and social scientists is not likely to cumulate.

A framework is thus useful in providing a common set of potentially relevant variables and their subcomponents to use in the design of data collection instruments, the conduct of fieldwork, and the analysis of findings about the sustainability of complex SESs. It helps identify factors that may affect the likelihood of particular policies enhancing sustainability in one type and size of resource system and not in others. Table 1 lists the second-level variables identified in many empirical studies as affecting interactions and outcomes. The choice of relevant second or deeper levels of variables for analysis (from the large set of variables at multiple levels) depends on the particular questions under study, the type of SES, and the spatial and temporal scales of analysis.

To illustrate one use of the SES framework, I will focus on the question: When will the users of a resource invest time and energy to avert "a tragedy of the commons"? Garrett Hardin (*17*) earlier argued that users were trapped in accelerated overuse and would never invest time and energy to extract themselves. If that answer were supported by research, the SES framework would not be needed to analyze this question. Extensive empirical studies by scholars in diverse disciplines have found that the users of many (but not all) resources have invested in designing and implementing costly governance systems to increase the likelihood of sustaining them (*3*, *6*, *7*, *18*).

A theoretical answer to this question is that when expected benefits of managing a resource exceed the perceived costs of investing in better rules and norms for most users and their leaders, the probability of users' self-organizing is high (supporting online material text). Although joint benefits may be created, self-organizing to sustain a resource costs time, and effort can result in a loss of short-term economic gains. These costs, as well as the fear that some users will cheat on rules related to when, where, and how to harvest, can lead users to avoid costly changes and continue to overharvest (*6*). Accurate and reliable measures of users' perceived benefits and costs are difficult and costly to obtain, making it hard to test theories based on users' expected net benefits.

Multiple variables that have been observed and measured by field researchers are posited to affect the likelihood of users' engaging in collective action to self-organize. Ten second-level variables (indicated by asterisks in Table 1) are frequently identified as positively or negatively affecting the likelihood of users' self-organizing to manage a resource (*3*, *6*, *19*, *20*). To explain why these variables are potentially important for understanding sustainability and, in particular, for addressing the question of when self-organization activities will occur, I briefly discuss how they affect perceived benefits and costs.

Size of resource system (RS3). For land-related resource systems, such as forests, very large territories are unlikely to be self-organized given the high costs of defining boundaries (e.g., surrounding with markers or fences), monitoring use patterns, and gaining ecological knowledge. Very small territories do not generate substantial flows of valuable products. Thus, moderate territorial size is most conducive to self-organization (*15*). Fishers who consistently harvest from moderately sized coastal zones, lakes, or rivers are also more likely to organize (*13*) than fishers who travel the ocean in search of valuable fish (*5*).

Productivity of system (RS5). A resource system's current productivity has a curvilinear effect on self-organization across all sectors. If a water source or a fishery is already exhausted or apparently very abundant, users will not see a need to manage for the future. Users need to observe some

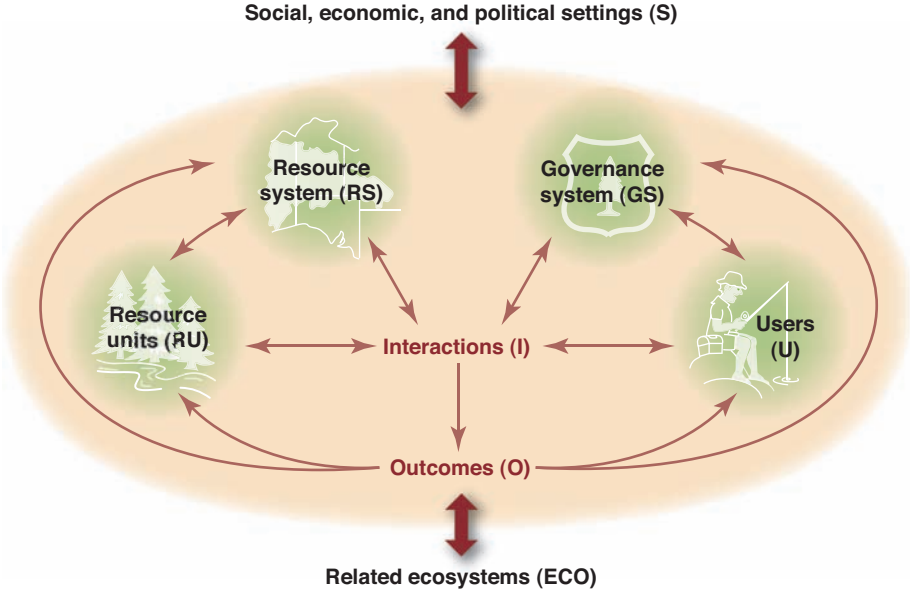

Fig. 1. The core subsystems in a framework for analyzing social-ecological systems.

scarcity before they invest in self-organization (*19*).

Predictability of system dynamics (RS7). System dynamics need to be sufficiently predictable that users can estimate what would happen if they were to establish particular harvesting rules or no-entry territories. Forests tend to be more predictable than water systems. Some fishery systems approach mathematical chaos and are particularly challenging for users or government officials (*21*). Unpredictability at a small scale may lead users of pastoral systems to organize at larger scales to increase overall predictability (*22*, *23*).

Resource unit mobility (RU1). Due to the costs of observing and managing a system, self-organization is less likely with mobile resource units, such as wildlife or water in an unregulated river, than with stationary units such as trees and plants or water in a lake (*24*).

Number of users (U1). The impact of group size on the transaction costs of self-organizing tends to be negative given the higher costs of getting users together and agreeing on changes (*19*, *20*). If the tasks of managing a resource, however, such as monitoring extensive community forests in India, are very costly, larger groups are more able to mobilize necessary labor and other resources (*25*). Thus, group size is always relevant, but its effect on self-organization depends on other SES variables and the types of management tasks envisioned.

Leadership (U5). When some users of any type of resource system have entrepreneurial skills and are respected as local leaders as a result of prior organization for other purposes, self-organization is more likely (*19*, *20*). The presence of college graduates and influential elders, for example, had a strong positive effect on the establishment of irrigation organization in a stratified sample of 48 irrigation systems in Karnataka and Rajasthan, India (*16*).

Norms/social capital (U6). Users of all types of resource systems who share moral and ethical standards regarding how to behave in groups they form, and thus the norms of reciprocity, and have sufficient trust in one another to keep agreements will face lower transaction costs in reaching agreements and lower costs of monitoring (*20*, *26*, *27*).

Knowledge of the SES (U7). When users share common knowledge of relevant SES attributes, how their actions affect each other, and rules used in other SESs, they will perceive lower costs of organizing (*7*). If the resource system regenerates slowly while the population grows rapidly, such as on Easter Island, users may not understand the carrying capacity of the resource, fail to organize, and destroy the resource (*28*).

Importance of resource to users (U8). In successful cases of self-organization, users are either dependent on the RS for a substantial portion of their livelihoods or attach high value to the sustainability of the resource. Otherwise, the costs of organizing and maintaining a self-governing system may not be worth the effort (*3*, *7*, *15*).

Collective-choice rules (GS6). When users, such as the Seri fishers in Mexico (*29*) and forest user groups in Nepal (*30*), have full autonomy at the collective-choice level to craft and enforce some of their own rules, they face lower transaction costs as well as lower costs in defending a resource against invasion by others (*5*).

Obtaining measures for these 10 variables is the first step in analyzing whether the users of one or more SESs would self-organize. Data analysis of these relationships is challenging, because the impact of any one variable depends on the values of other SES variables. As in most complex systems, the variables interact in a nonlinear fashion (*8*–*10*). Furthermore, although the long-term sustainability of SESs is initially dependent on users or a government to establish rules, these rules may not be sufficient over the long run (*7*, *18*).

If the initial set of rules established by the users, or by a government, are not congruent with local conditions, long-term sustainability may not be achieved (*8*, *9*, *18*). Studies of irrigation systems (*16*, *26*), forests (*25*, *31*), and coastal fisheries (*13*) suggest that long-term sustainability depends on rules matching the attributes of the resource system, resource units, and users. Rules forbidding the harvest of pregnant female fish are easy to monitor and enforce in the case of lobster, where eggs are visibly attached to the belly, and have been important in sustaining lobster fisheries (*13*). However, monitoring and enforcing these rules have proven more difficult in the case of gravid fish, where the presence of internal eggs is harder to assess.

Comparative studies of rules used in long-surviving resource systems governed by traditional societies document the wide diversity of rules used across sectors and regions of the world (*21*). Simple blueprint policies do not work. For example, the total allowable catch quotas established by the Canadian government for the west coast of Canada led to widespread dumping of unwanted fish, misrepresentation of catches, and the closure of the groundfishery in 1995 (*32*). To

Table 1. Examples of second-level variables under first-level core subsystems (S, RS, GS, RU, U, I, O and ECO) in a framework for analyzing social-ecological systems. The framework does not list variables in an order of importance, because their importance varies in different studies. [Adapted from (*12*)]

Social, economic, and political settings (S)	
S1 Economic development. S2 Demographic trends. S3 Political stability. S4 Government resource policies. S5 Market incentives. S6 Media organization.	
Resource systems (RS)	*Governance systems (GS)*
RS1 Sector (e.g., water, forests, pasture, fish)	GS1 Government organizations
RS2 Clarity of system boundaries	GS2 Nongovernment organizations
RS3 Size of resource system*	GS3 Network structure
RS4 Human-constructed facilities	GS4 Property-rights systems
RS5 Productivity of system*	GS5 Operational rules
RS6 Equilibrium properties	GS6 Collective-choice rules*
RS7 Predictability of system dynamics*	GS7 Constitutional rules
RS8 Storage characteristics	GS8 Monitoring and sanctioning processes
RS9 Location	
Resource units (RU)	*Users (U)*
RU1 Resource unit mobility*	U1 Number of users*
RU2 Growth or replacement rate	U2 Socioeconomic attributes of users
RU3 Interaction among resource units	U3 History of use
RU4 Economic value	U4 Location
RU5 Number of units	U5 Leadership/entrepreneurship*
RU6 Distinctive markings	U6 Norms/social capital*
RU7 Spatial and temporal distribution	U7 Knowledge of SES/mental models*
	U8 Importance of resource*
	U9 Technology used
Interactions (I) → outcomes (O)	
I1 Harvesting levels of diverse users	O1 Social performance measures (e.g., efficiency, equity, accountability, sustainability)
I2 Information sharing among users	
I3 Deliberation processes	
I4 Conflicts among users	O2 Ecological performance measures (e.g., overharvested, resilience, bio-diversity, sustainability)
I5 Investment activities	
I6 Lobbying activities	
I7 Self-organizing activities	O3 Externalities to other SESs
I8 Networking activities	
Related ecosystems (ECO)	
ECO1 Climate patterns. ECO2 Pollution patterns. ECO3 Flows into and out of focal SES.	

*Subset of variables found to be associated with self-organization.

remedy this initial failure, the government reopened the fishery but divided the coastal area into more than 50 sectors, assigned transferable quotas, and required that all ships have neutral observers onboard to record all catches (*32*).

Furthermore, the long-term sustainability of rules devised at a focal SES level depends on monitoring and enforcement as well their not being overruled by larger government policies. The long-term effectiveness of rules has been shown in recent studies of forests in multiple countries to depend on users' willingness to monitor one another's harvesting practices (*15*, *31*, *33*, *34*). Larger-scale governance systems may either facilitate or destroy governance systems at a focal SES level. The colonial powers in Africa, Asia, and Latin America, for example, did not recognize local resource institutions that had been developed over centuries and imposed their own rules, which frequently led to overuse if not destruction (*3*, *7*, *23*).

Efforts are currently under way to revise and further develop the SES framework presented here with the goal of establishing comparable databases to enhance the gathering of research findings about processes affecting the sustainability of forests, pastures, coastal zones, and water systems around the world. Research across disciplines and questions will thus cumulate more rapidly and increase the knowledge needed to enhance the sustainability of complex SESs. Quantitative and qualitative data about the core set of SES variables across resource systems are needed to enable scholars to build and test theoretical models of heterogeneous costs and benefits between governments, communities, and individuals and to lead to improved policies.

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PERSPECTIVE

Economic Networks: The New Challenges

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The current economic crisis illustrates a critical need for new and fundamental understanding of the structure and dynamics of economic networks. Economic systems are increasingly built on interdependencies, implemented through trans-national credit and investment networks, trade relations, or supply chains that have proven difficult to predict and control. We need, therefore, an approach that stresses the systemic complexity of economic networks and that can be used to revise and extend established paradigms in economic theory. This will facilitate the design of policies that reduce conflicts between individual interests and global efficiency, as well as reduce the risk of global failure by making economic networks more robust.

The economy, as any other complex system, reflects a dynamic interaction of a large number of different agents, not just a few key players. The resulting systemic behavior, observable on the aggregate level, often shows consequences that are hard to predict, as illustrated by the current crisis, which cannot be simply explained by the failure of a few major agents. Thus, we need a more fundamental insight into the system's dynamics and how they can be traced back to the structural properties of the underlying interaction network.

Research examining economic networks has been studied from two perspectives; one view comes from economics and sociology; the other originated in research on complex systems in physics and computer science. In both, nodes represent the different individual agents, which can represent firms, banks, or even countries, and where links between the nodes represent their mutual interactions, be it trade, ownership, R&D alliances, or credit-debt relationships. Different agents may have different behaviors under the same conditions and have strategic interactions (*1*). These evolving interactions can be represented by network dynamics that are bound in space and time and can change with the environment and coevolve with the agents (*2*). Networks are formed or devolve on the basis of the addition or deletion of either agents or the links between them.

The socioeconomic perspective has emphasized understanding how the strategic behavior of the interacting agents is influenced by—and reciprocally shapes—relatively simple network architectures. One common example is that of a star-spoke network, like a very centralized or-

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*"*His lips drink water but his heart drinks wine": Groundwater availability, access, and governance in the Guadalupe Valley, Mexico

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Module I:

Angelo Cetto reined in his mare and came to a halt. This spot - on the route back from Tijuana - was his favorite and he always stopped here firstly for the view and secondly to rest briefly and drink the last of his water before beginning the final descent home. He lifted his hand to shade his eyes against the glaring afternoon sunlight and then, tilting his head back slightly he breathed in deeply and took in the scenery. There it was, stretched out before him as far as the eye could see - his valle di Guadalupe, *interrupted in the distance only by the Sierra Blanca, a majestic backdrop that completed the scene.*

It had been a hot, bumpy drive down through the mountains from Tijuana, through San Jose de la Zorra and Aguas Escondidos and a decent ride on horseback from the Mission, where he'd replenished his canister at the village well. He was eager to get home. But as he surveyed the expanse of land before him, he found himself transported back to his home in Selva di Levico, in Piedmont, Italy. Ten years ago, he had left his motherland and traded the Alps for the Sierra Madres in search of adventure and to fulfill a dream, It was now 1928, and even from this distance, he could make out the neat rows of grapevines marching toward the horizon in perfect unison. He was transforming this valley into a vineyard, like the one he had left behind in Italy. Here, in this wilderness, he would produce a wine fit for Italian palate. He smiled. He could already taste the sharp, earthy sip of the first cask of wine they would produce by the end of the year.

Life has wonderful surprises, he thought. With the success of his first vineyard near Tijuana, he had transformed himself into a business man, selling sherry and port to locals and the Americans who had come across the border in search of refreshment, and to escape prohibition. It had been a good idea, using the weak grapes and fortifying them into high quality aperitifs. But he had not left Italy to make port for Americans, and he knew he was capable of more. Four years ago, on word from a friend, he had come south to explore the Guadalupe Valley. At this very same spot, he had stopped and as he sat on his horse overlooking the green fields bounded by granite mountains, he had known then - as he knew now - that his search was over.

The story of Angelo Cetto foreshadows the changes awaiting the Guadalupe Valley which is not unlike other regions in Mexico. Rapid urban and agricultural (mostly viticulture) development in the region has stressed the local water resources and continuous to do so, three generations later since Don Cetto first arrived in the Valley. The already semi-arid region is growing even drier as groundwater levels drop. This case study is representative of other arid parts of Mexico where the majority of the country's agriculture is produced (NRC et al. 2007). It is also demonstrative of a global approach of water management that entails local governance as a primary mechanism to ensure cooperation with increasing groundwater regulations. In Mexico, regions where groundwater is overexploited, new regulations prohibit further well development AND require groundwater users to register their wells in order to receive volumetric water use rights.

[handouts 1 to 4 and video]

Chantelise Pells

Sustainability and Groundwater Resources
Physical characteristics of the system:

The concepts of sustainable pumping and sustainability of groundwater systems mean two different things. Sustainable pumping and safe yield are derived from water supply engineering studies that define sustainable pumping to be groundwater extraction that does not exceed natural recharge. In 1940, Theis countered this belief known as the 'water budget myth' (Bredehoeft 2002) by showing the interrelationship of groundwater withdrawals and natural discharge to lakes, streams and wetlands. It is now understood that the sustainable yield of an aquifer is considerably less than recharge (Sophocleous 2000). Bredenhoeft explains that sustainable pumping is better understood as the *capture* of increased recharge and natural discharge where no water is removed from storage. Additionally, the rate of capture in a ground water system is related to the dynamics of the system and not natural recharge (Bredehoeft 2002).

As the impacts of groundwater consumption are now better understood a new definition and approach to management is needed to reflect the conceptual change. Devlin and Sophocleos make the distinction between sustainable borehole yield and basin yield. They explain that the *capture principle* discussed by Bredehoeft is the sustainable borehole (well) yield. In other words the borehole yield is the capture of groundwater that is possible whereas the groundwater basin yield describes the amount of groundwater extraction that is permissible (Devlin & Sophocleous 2005; Seward et al. 2007). "For example, it may be possible to sustain pumping at a given rate but the consequences to the environment and to other users may not be permissible" (Seward et al. 2007, p.476).

According to some authors in order to develop a sustainable management plan that addresses the ecological and socio-economic impacts of groundwater pumping a broader definition of sustainable pumping needs to be considered. Furthermore, the diversity of groundwater systems as well as the socio-economic and legal parameters requires a context specific groundwater management agenda. Alley and Maimone among others suggest the role of hydrogeolgists is better served by preparing modeled forecasts of the long term implications of various management scenarios so that groundwater users are better informed to make decisions rather than focusing on safe yields (Alley 1999; Maimone 2004; Sophocleous 2000; Seward et al. 2007).

According to Sophocleous the spatial and temporal dimensions of groundwater require an adaptive management approach that introduces flexibility in the face of uncertainty (Sophocleous 2000). Sophocleous discusses the safe yield outcomes in Western Kansas demonstrating that persistent water level declines affect surface water stream flows long before groundwater resources are threatened with exhaustion. Sophocleous proposes modeling a transition curve from groundwater storage depletion to full reliance on induced recharge in combination with a projected pattern of drawdown. Groundwater development would be determined with withdrawal rates, well-field location, drawdown limits, and a defined planning horizon (Sophocleous 1997; Sophocleous 2000). However Sophocleous admits that although advances in groundwater numerical modeling are potential resources for groundwater management, the key parameters such as recharge are subject to spatial and temporal variability and thus uncertainty. In light of

this, Sophocleous recommends a management approach that quantifies risk and uncertainty with strong education and outreach to positively influence attitudes of stakeholders.

Maimone presents an adaptive management framework for addressing the principles of sustainable yield: 1) *Understand the spatial aspects of the problem*; 2) *Develop a conceptual water budget*; 3) *Understand the boundaries of the system;* 4) *Understand water needs;* 5) *Consider the temporal aspect of sustainable yield*; 6) *Consider effects of changing technology*; 7) *Work with stakeholders to understand tradeoffs;* 8) *Recognize limits to our knowledge* (Maimone 2004). In a sustainable management framework considerations for the water quality, ecology and socio-economic conditions and a new aquifer equilibrium (long term condition of the aquifer where no water is removed from storage) appeal to the importance of (induced) recharge rates in determining future environmental impacts (Devlin & Sophocleous 2005). Increased recharge can occur from induced recharge from water bodies, redirection of discharge to streams as aquifer inflow, return flow of irrigation water that is not consumed (Kendy 2003), and increased drainage gradients from the vadose zone to the aquifer due to the lowering of the water table (Devlin & Sophocleous 2005).

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Table 1 Key: Human - hydrology interface for the Guadalupe Valley: What we know			
Interaction between factor A to factor B	***Definition/description of the interaction***	***Unit that could be used to quantify the interaction***	***Existing data on interactions***
Farmer to aquifer	Farmer pollutes aquifer (contamination)	Parts per million of contaminants	Daessle 2006; COTAS 2013; http://www.cotasguadalupe.com/
Aquifer to Farmer	Farmer extracts water from aquifer	Cubic meters of water per second	Not currently available; Volumetric permit data available via REPDA http://www.conagua.gob.mx/Repda.aspx?n1=5&n2=37&n3=115
Subsistence farmer to grape farmer	Subsistence farmer and grape farmer extract water from aquifer	Amount of water extracted relative to each other (m3)	http://www.cotasguadalupe.com/
Farmers to Residential well owner	Farmer and residential water user extract water from aquifer	% water available for downstream users; quality of water for downstream users (contamination rates)	http://www.cotasguadalupe.com/
CONAGUA to farmers	Regulations that determine groundwater use	M3 water permitted to extract	http://www.conagua.gob.mx/home.aspx
Farmers to CONAGUA	Farmers register wells and report usage to CONAGUA	Documents required annually for groundwate	http://www.conagua.gob.mx/home.aspx

		r extraction No. permits granted for water access	
Farmers to urban users	Farmers and urban users (provided via urban water purveyor CESPE)	Amount of water extracted relative to each other (m3)	http://www.cotasguadalupe.com/ http://www.conagua.gob.mx/Repda.aspx?n1=5&n2=37&n3=115
**Basically all those actors & institutions interacting with one another and with the water/biophysical system			

Characteristics of Confined and Unconfined Aquifers

Unconfined and confined aquifers are distinct in several ways. A confined aquifer is located between two layers of confining material, an aquiclude or aquitard, and an unconfined aquifer is found where there is no overlying aquitard or aquiclude. In areas where there is more than one aquifer layer, the uppermost layer is typically an unconfined aquifer. Recharge via precipitation of an unconfined layer is therefore unrestricted. The water level found in a well (when not pumping) will be the same water level of the unconfined aquifer (excluding the capillary fringe).

A confined aquifer properties are more complex and indirect. Water in a confined aquifer is under pressure because of its position below the water table of the recharge area. Because of this pressure the water level of a well is significantly higher than the aquifer below, known as an artesian well. In some cases the water pressure is so great that water from the well flows freely above the land surface (Fetter 1994; Harter 2008).
The amount of water available (storativity) in an aquifer is given by the expression:

$$S_s=\rho_w g\,(\alpha+n\beta)$$

where:

ρ_w is the density of the water
g is the acceleration of gravity
α is the compressibility of the aquifer skeleton
n is the porosity
β is the compressibility of the water (Fetter 1994)

It should be noted that the value of specific storage is very small.

The storativity (S) of a *confined aquifer* is the product of the specific storage (S_s) and the aquifer thickness (b) which is given in the expression:

$$S = bS_s$$

(Fetter 1994; Harter 2008)

During pumping, the water released from storage is accounted for by the decompression of the sediment structure and depressurization (expansion) of water thereby maintaining saturation. Due to these properties the amount of water actually lost from storage is very small yielding a storage coefficient of 0.0005%-0.5% .

In an *unconfined* aquifer saturated thickness rises or falls in relation to changes in water storage. As water level falls, water drains from pore spaces. The storage capacity is the specific yield (S_y) and specific storage (S_s) of the aquifer. The storage coefficient is expressed by the formula:

$$S = S_y + hS_s$$ (Fetter 1994; Harter 2008)

Where h is the thickness of the saturated zone (Fetter 1994)

The storativity is equal to its specific yield in an *unconfined aquifer* due to the small values of specific storage. Values for specific yield (or the percentage of water released per unit decline in water level) for an unconfined aquifer range from 1%-40% (Harter 2008).

Water storage changes occur due to natural discharge (via aquatic features, evapotranspiration), pumping, natural recharge (precipitation, aquatic sources) and artificial recharge. Figure 1 depicts water budgets (changes in water storage) under natural conditions where inflow equals outflow (A) and changes in groundwater system being pumped (B). Changes occur in recharge, discharge and amount of water stored. Increased recharge potential from precipitation etc..and less water leaving the system (discharge) to other streams, lakes etc.., and decreased transpiration by plants rooted near the water table (Alley 1999). Changes in storage can also occur due to decreases in recharge from drought. Also, not all water that is pumped is consumed (evapotranspiration) with some returning to groundwater system.

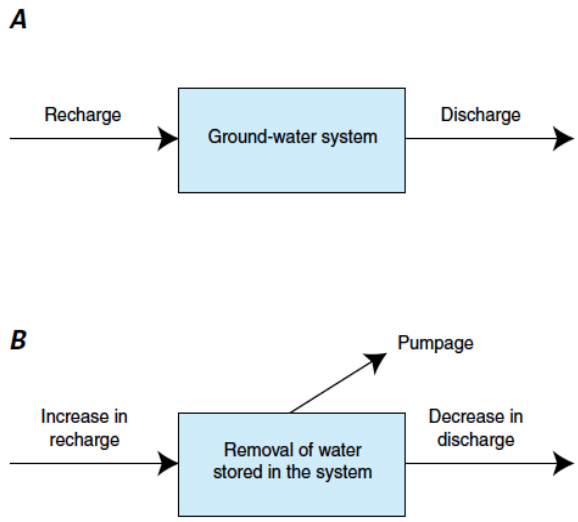
Pumpage = Increased recharge + Water removed from storage + decreased discharge

$\Delta R = \Delta D + Q$ or $Q = \Delta R - \Delta D$

where

ΔR = change in recharge from pumping
ΔD= change in discharge from pumping
Q = rate of abstraction (volume)

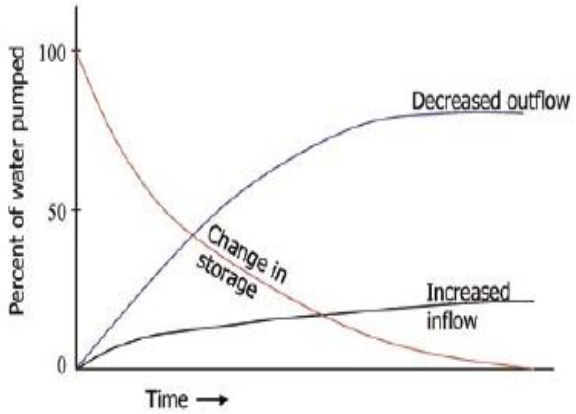
Figure 1



Source: Alley 1999

(Seward et al. 2007)

Figure 2: Effects of pumping on inflow and outflow and storage



Source: Leake 2001 cited in Seward et al. 2007

Amount of water drained from an aquifer as the hydraulic head is lowered is expressed in the formula:

$$V_w = SA\ \Delta h$$

where:

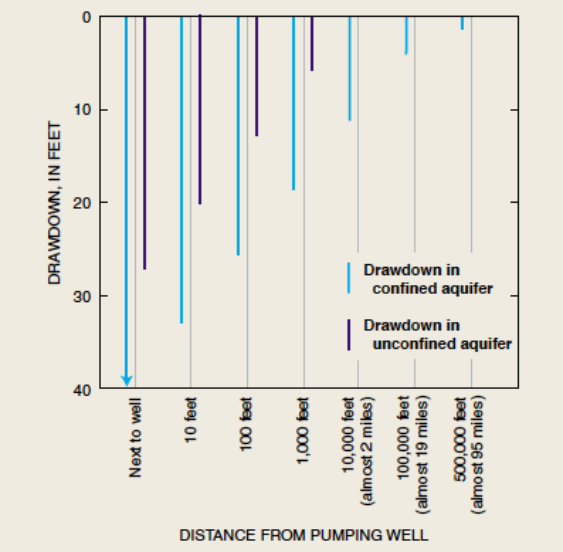
V_w is the volume of water drained
S is the storativity
A is the surface area
Δh is the average decline in head (Fetter 1994)

As a result of continuous pumping, changes in storativity can only occur in a confined aquifer when the pressure head falls below the confining layer rendering it an unconfined aquifer.

B. In a *confined aquifer* pumping from a well decreases the interior water level creating lower pressure in the deeper part of the well. Only a small amount of water is released from a confined aquifer per unit decline in the potentiometric surface. As previously discussed the decrease in water pressure allows the water to expand and causes the compression of the earth material in the aquifer. The drawdown and lateral extent of water level drawdown caused by pumping wells in a confined aquifer in comparison to an unconfined aquifer is much greater due to the decrease in water pressure in the aquifer within the cone of depression. Whereas in an *unconfined* aquifer pumping from a well dewaters the areas surrounding the well which then pulls water from storage in the cone of depression (Alley & Geological 1999; Harter 2008). ***Figure 3*** demonstrates the difference between drawdown and lateral extent of confined aquifers and unconfined aquifers.

Parameters for calculating drawdown developed by Theis (1940)

K hydraulic conductivity
B aquifer thickness
T transmissivity
S Storage
T duration of pumping
Q rate of pumping



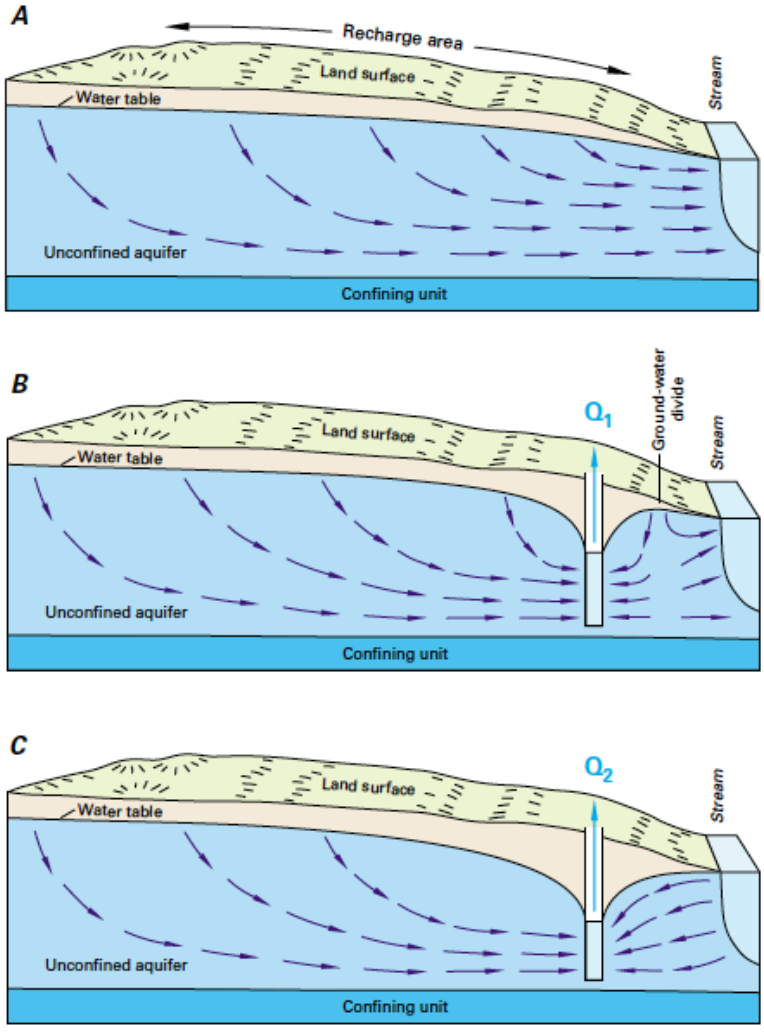
Source: Alley 1999

C. The potential effects of groundwater pumping from a *confined aquifer* on wetlands are not as severe as an unconfined aquifer since there is not as direct interaction with the surface water systems. Wetlands can be considered a groundwater feature that are mostly a result of discharge rather than precipitation (excluding bogs) (Alley 1999; Winter 1999). If the hydraulic head falls

below the confining layer, than impacts of dewatering of the overlying aquifer may reduce the available discharge for the wetland. If pumping in an *unconfined aquifer* equals natural recharge than surface water systems (lakes, streams and wetlands) will eventually dry up (see *Figure 4)*(Sophocleous 2000). In contrast to streams as sources of groundwater recharge, wetlands interact with the groundwater system primarily as recipients of discharge. However Figure 4 illustrates the impact of groundwater pumping as interrupting natural discharge to streams with the same outcome as wetlands.

An increase in the frequency of water level fluctuations (hydroperiod) can be detrimental to the wetland environment such as the vegetation types, nutrient cycling, and the type of invertebrates, fish, and bird species. The timing of pumping can be critical during the hydroperiod. For example an unusual lowering of water levels during the vegetative growth period may be more damaging than during the low growing phase. If water levels decline during this time, effects to the wetland system can be significant and detrimental (Hunt et al. 1999; Alley 1999).

Figure 4



Source: Alley 1999

D. All groundwater is vulnerable to contamination because of the connection with the land surface and contaminating sources (Harter 2008). However most vulnerability assessments concentrate on the shallowest groundwater zones since they are the most vulnerable to

contamination. Vulnerability is defined as "degree of insulation" that natural and man-made factors provide to keep pollution away from groundwater" (Harter 2008, p.184). Vulnerability depends on the pollutant type that can become less harmful overtime. For example, pathogens survive for shorter periods, days to months where organic chemicals degrade over longer periods sometimes taking years to decades (Harter 2008)

Confined aquifers are typically less vulnerable to allochthonous inputs (contaminants external to the system) because of the protection of the confining layer. Most confined aquifers are far below the land surface and therefore vulnerability is low because of the long travel time to reach the aquifer (Harter 2008). Confined aquifers are most vulnerable to autochthonous inputs, contaminants internal to the system, such as some aquifers can contain saline water, arsenic, selenium, chromium, and nitrate (Fogg 2008). Confined aquifers can become more vulnerable to contamination when the hydraulic head is lowered through pumping. Decreasing heads can cause movement of poor quality water from surrounding aquifers, which may impact development of the aquifer more than declining heads. For example a confined aquifer may be hydraulically connected to other confined units with high-dissolved solids concentrations (the total organic and inorganic substances). In addition, seawater intrusion of the aquifer may occur in coastal areas due to excessive pumping (Alley 1999).

Unconfined aquifers are vulnerable to contamination because these aquifers are typically the closest to contaminating sources (agriculture nitrates, pesticides, industrial pollutants etc…). Most of the degradation of synthetic chemicals occurs in the soil layer, the uppermost, unsaturated zone. Typically the higher the recharge rate, the greater the vulnerability to contamination as it induces the migration of contaminants. This is important in semi-arid irrigated agriculture where there is an increase in recharge from the additional water that is not consumed by the plants roots. Other important aquifer characteristics are the permeability of soil and geologic formation type that impact the travel time of a contaminant (Harter 2008). The transport of contaminants is determined by groundwater flow and is calculated using Darcy's equation for groundwater flow (see formula below)(Fogg 2008). Unconfined aquifers are also susceptible to contamination when pumping results in a non-equilibrium state (overdraft). A decline in hydraulic head and storage can induce saline intrusion in coastal zones, concentration of contaminants from agriculture, wastewater and industrial pollutants (Alley 1999).

Contaminant transport by groundwater flow or advection:

$$V = (K/n) \times i$$

where

K = hydraulic conductivity [L/T]
N = porosity
i = magnitude of hydraulic gradient (or rate of decline of hydraulic head)

(Fogg 2008)

Resources

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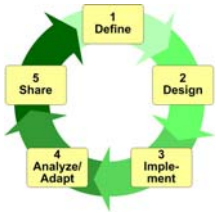
Cross-Cutting Tool

Stakeholder Analysis

October 2005



Resources for Implementing the WWF Standards

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This document is intended as a resource to support the implementation of the *WWF Standards of Conservation Project and Programme Management.* Stakeholder analysis is an important component of many of the steps in these standards.

This document may change over time; the most recent version can be accessed at: https://intranet.panda.org/documents/folder.cfm?uFolderID=60976

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Stakeholder Analysis

What Is Stakeholder Analysis?

A "stakeholder" can be defined as:

> *Any individual, group, or institution who has a vested interest in the natural resources of the project area and/or who potentially will be affected by project activities and have something to gain or lose if conditions change or stay the same.*

Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success. Stakeholder analysis identifies all primary and secondary stakeholders who have a vested interest in the issues with which the project or policy is concerned. The goal of stakeholder analysis is to develop a strategic view of the human and institutional landscape, and the relationships between the different stakeholders and the issues they care about most.

Why Stakeholder Analysis Is Important

Ultimately, all projects depend on selecting stakeholders with whom they can jointly work towards goals that will reduce or reverse the threats to your key conservation targets.

A stakeholder analysis can help a project or programme identify:

- The interests of all stakeholders who may affect or be affected by the programme/project;
- Potential conflicts or risks that could jeopardise the initiative;
- Opportunities and relationships that can be built on during implementation;
- Groups that should be encouraged to participate in different stages of the project;
- Appropriate strategies and approaches for stakeholder engagement; and
- Ways to reduce negative impacts on vulnerable and disadvantaged groups.

The full participation of stakeholders in both project design and implementation of is a key to – but not a guarantee of – success. Stakeholder participation:

- Gives people some say over how projects or policies may affect their lives;
- Is essential for sustainability;
- Generates a sense of ownership if initiated early in the development process;
- Provides opportunities for learning for both the project team and stakeholders themselves; and
- Builds capacity and enhances responsibility.

When to Use Stakeholder Analysis

Stakeholder analysis can be undertaken throughout all stages of the project cycle, but it definitely should be undertaken at the outset of a project or programme. In particular, during the *Define* phase, stakeholder analysis is a crucial component of situation analysis (Step 1.4 in the *WWF Standards of Conservation Project and Programme Management*). As you go through your situation analysis, stakeholder analysis provides a preliminary identification of key stakeholders, indicating who is

important and influential and how they can be involved in the programme. During the *Design* phase (Step 2.1), a detailed stakeholder analysis, involving all key stakeholders, will help shape the development of strategic actions and inform risk analysis. In the *Implement* phase (Step 3.4, in particular), stakeholder analysis will help identify who, how and when stakeholders should be involved in project/programme activities. Later, during the *Analyze/Adapt* and S*hare* phases, the stakeholder analysis serves as a reminder, providing a benchmark against which projects can monitor and evaluate the effectiveness of their engagement with stakeholders, both supportive and opposing.

Stakeholder analysis is also an appropriate time to explore whether or not gender will be a factor in the elaboration and implementation of future efforts. It is well documented that discrimination by gender is likely to diminish the impact and effectiveness of projects and policies. Furthermore, the inclusion of women as stakeholders has the potential to achieve both better management of the resource base and improved community welfare. Gender analysis involves the assessment of:

- The distribution of tasks, activities, and rewards associated with the division of labour at a particular locality or across a region;
- The relative positions of women and men in terms of representation and influence; and
- The benefits and disincentives associated with the allocation of tasks to women and men.

How to Develop and Use Stakeholder Analysis

Given the potential impact of stakeholder attitudes and influence on the success of a project, it is often best to ensure a wide scope of the stakeholder analysis during the *Define* and *Design* phases to make sure that legitimate stakeholder interests and concerns are effectively addressed during the *Implement* and *Analyze/Adapt* phases.

There are a number of ways of undertaking a stakeholder analysis. Workshops, focus groups and interviews are three common approaches. During the course of the project cycle you may use all three, matching the technique to the evolving needs of the project. Whatever approach is used, there are three essential steps in stakeholder analysis: 1) Identifying the key stakeholders and their interests (positive or negative) in the project; 2) Assessing the influence of, importance of, and level of impact upon each stakeholder; and 3) Identifying how best to engage stakeholders. We describe key questions to ask at each of these steps and provide an example of a tool.

1. Identifying the key stakeholders and their interests (positive or negative) in the project

As outlined in the *Basic Guidance to Situation Analysis,* any given threat or opportunity factor has one or more stakeholder groups associated with it. To analyse stakeholder groups, you can thus either start with your situation analysis and think about the key stakeholders associated with each, or start with an analysis of the stakeholders and then link them to specific threat and opportunity factors.

Some of the key questions you should ask at this step include:

- How are the threatened project targets being used? By whom? Who is threatening the conservation target?

- Who is most dependent on the resources at stake? Is this a matter of livelihood or economic advantage? Are these resources replaceable by other resources?
- Who possesses claims – including legal jurisdiction and customary use – over the resources at stake? Are several government sectors and ministry departments involved? Are there national and/or international bodies involved because of specific laws or treaties?
- Who are the people or groups most knowledgeable about, and capable of dealing with, the resources at stake? Who is managing these resources? With what results?
- Are the stakeholders and their interests geographically and seasonally stable, or are there migration patterns?
- Are there major events or trends currently affecting the stakeholders (e.g., development initiatives, land reforms, migration, population growth)?
- Has there been a similar initiative in the region? If so, to what extent did it succeed? Who was in charge and how did local stakeholders respond?

A useful tool for this first step – identifying the key stakeholders and their interests – is given in the table below. Begin by brainstorming all possible stakeholders using the above questions as a guide. Then research the human environment. Talk to various stakeholders, and ask them who they would see as potential stakeholders for the initiative in question. Your list of stakeholders may grow or shrink as your analysis progresses, and your understanding deepens. Next try to learn about each stakeholder group in as much depth as possible.

To fill out the first column in the matrix below, list the stakeholders in relation to the above list of questions. Number your stakeholders for easy reference. Then describe the stake or mandate of each stakeholder in the second column. The mandate refers to the nature and limits of each stakeholder's stake in the resource (e.g. livelihoods, profit, lifestyles, cultural values, spiritual values, etc.), and the basis of that stake (e.g. customary rights, ownership, administrative or legal responsibilities, intellectual rights, social obligation, etc.). For each stakeholder, describe their potential role in the project in column 3. Then note in column 4 if the stakeholder is marginalized, e.g. women, indigenous peoples, ethnic minorities, youth, or other impoverished or disenfranchised groups. Marginalized stakeholders lack the recognition or capacity to participate in collaboration efforts on an equal basis, and particular effort must be made to ensure and enable their participation. In the last column decide who are the key stakeholders, i.e., those who – because of claims over or direct dependence on the resources, or their power, authority, or responsibility – are central to the initiative at hand. Their participation is critical.

Table 1. Stakeholder Analysis Matrix

Stakeholders	Stake / Mandate	Potential Role in Project	Margina-lized?	Key?

2. Assessing the influence and importance of each stakeholder as well as the potential impact of the project upon each stakeholder

Key questions for this second step in a stakeholder analysis include:

- Who is directly responsible for decisions on issues important to the project?
- Who holds positions of responsibility in interested organizations?
- Who is influential in the project area (both thematic and geographic areas)?
- Who will be affected by the project?
- Who will promote/support the project, provided that they are involved?
- Who will obstruct/hinder the project if they are not involved?
- Who has been involved in the area (thematic or geographic) in the past?
- Who has not been involved up to now but should have been?

To continue with the second step of the stakeholder analysis – assessing the influence, importance, and level of impact upon each stakeholder – a simple grid is shown in Figure 1 that can be useful for thinking through how different types of stakeholders might be engaged. It organizes stakeholders according to their likely influence over decisions to be made, and the likely impact of project decisions upon them.

This analysis can be done using pieces of paper or cards on a table top or wall with the matrix written up on flipchart, as follows:

1. Identify stakeholders and write them on cards (one per card).
2. Organize and agree placement of cards on the matrix.
3. Consider relationships (e.g. responsibilities, rights, levels of conflict) within and between stakeholders in each area of the matrix.
4. Consider potential strategies (approaches, methods) for engaging different stakeholders in each area. The approaches in indicate common (but definitely not exclusive) approaches of engagement.

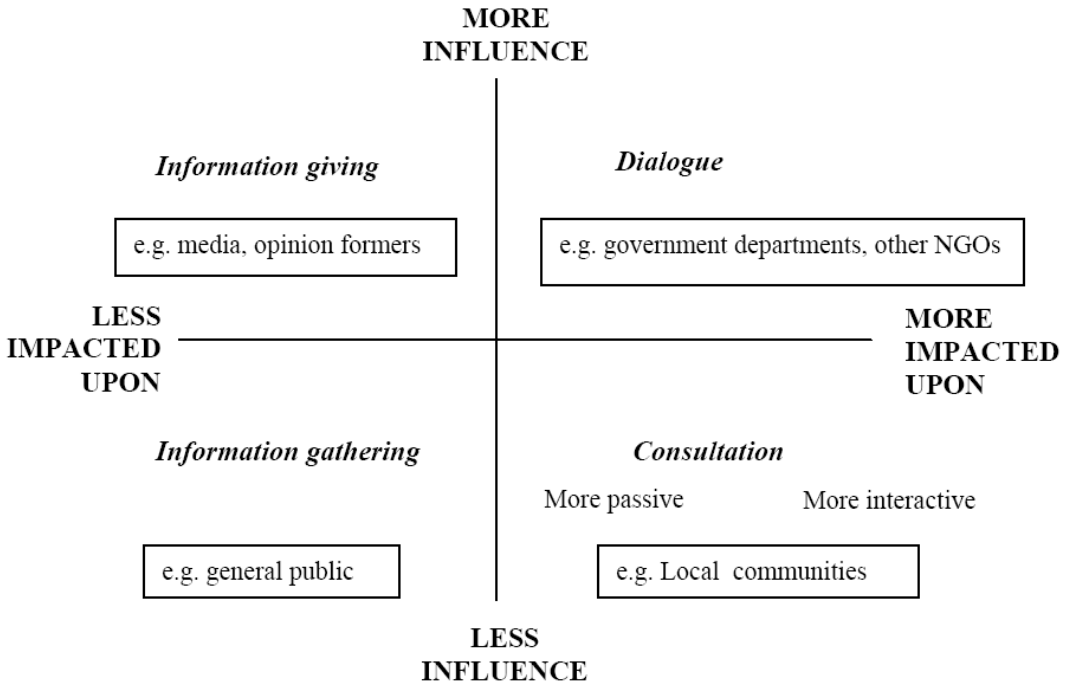
The following questions may prove useful when considering where stakeholders sit on the Influence/Impact analysis quadrant):

- Are they likely to influence the success or failure of your project?
- What is their relationship with WWF?
- What is their relationship with the project?
- Where are they now versus where you think they should be on the Influence/Impact quadrant?

3. Identifying how best to engage stakeholders

Finally, the third step involves determining how to involve the different stakeholders. Different types of stakeholders will be engaged in different ways in the various stages of the project, from gathering and giving information, to consultation, dialogue, working together, and partnership.

Figure 1. Stakeholder Analysis Grid
Note that the lines of the grid are not hard and fast boundaries – they are for guidance only.



This third step in the stakeholder analysis is covered in Step 3.4 of the Standards, which focuses on partnerships. Determining who needs or wants to be involved, and when and how that involvement can be achieved provides the basis for developing collaborations. Once stakeholder views are understood, a decision can be made on whether to pursue collaboration.

The importance of the process in planning and conducting successful collaborations cannot be overemphasized. Good-faith efforts are often derailed because the parties are not skilled in the collaboration process, and because insufficient attention is given to designing and managing it. Using an inclusive, transparent approach during project development and implementation will help build ownership and commitment. If it is not possible or realistic to have all key stakeholders involved from the outset, then a process for gradual involvement may be needed.

General Lessons

The increasing scope and ambition of many projects require a commitment to dialogue and collaboration with a diverse range of stakeholders. Dialogue that is open and transparent is critical to long-term success. Resource managers have learned a number of lessons in stakeholder collaboration, namely that:

- The goals of any collaboration venture must be clarified before engaging stakeholders. Goals help identify and target those interests that need to be represented in collaboration processes, and those that can be left out.
- It is fundamental that enough time be budgeted to explore stakeholder views, values and perspectives so that an understanding of the human and institutional landscape can be established.
- All key stakeholders must be involved in the design and implementation of policies and projects if successful results are to be achieved.
- Deciding who is "inside" or "outside" a collaboration process will always be relevant to project outcomes and to their sustainability.
- It is important that stakeholder participation not be exclusive, or controlled or dominated by any one group.
- All stakeholders will come to the process with their own biases.
- Stakeholder collaboration is a process that requires the opportunity and space for participants to listen to and learn from one another. It is important to create spaces for stakeholders to come together to develop and share their visions and agendas.
- Monitoring and evaluating the nature of the *collaboration* is as important as measuring specific project outcomes

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Section 2

Stakeholder Analysis Guidelines

Kammi Schmeer

Stakeholder Analysis Guidelines

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Stakeholder Analysis at a Glance

What Is Stakeholder Analysis?

Stakeholder analysis is a process of systematically gathering and analyzing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or program.

Who Is a Stakeholder?

Stakeholders in a process are actors (persons or organizations) with a vested interest in the policy being promoted. These stakeholders, or "interested parties," can usually be grouped into the following categories: international/donors, national political (legislators, governors), public (ministry of health [MOH], social security agency, ministry of finance), labor (unions, medical associations), commercial/private for-profit, nonprofit (nongovernmental organizations [NGOs], foundations), civil society, and users/consumers.

Which Stakeholder Characteristics Are Analyzed?

The analysis includes such stakeholder characteristics as knowledge of the policy, interests related to the policy, position for or against the policy, potential alliances with other stakeholders, and ability to affect the policy process (through power and/or leadership).

Why Is this Analysis Useful?

Policymakers and managers can use a stakeholder analysis to identity the key actors and to assess their knowledge, interests, positions, alliances, and importance related to the policy. This allows policymakers and managers to interact more effectively with key stakeholders and to increase support for a given policy or program. When this analysis is conducted *before* a policy or program is implemented, policymakers and managers can detect and act to prevent potential misunderstandings about and/or opposition to the policy or program. When a stakeholder analysis and other key tools are used to guide the implementation, the policy or program is more likely to succeed.

What Are the Steps in Stakeholder Analysis?

There are eight major steps in the process:

1. Planning the process
2. Selecting and defining a policy
3. Identifying key stakeholders
4. Adapting the tools
5. Collecting and recording the information
6. Filling in the stakeholder table
7. Analyzing the stakeholder table
8. Using the information

What Can Be Achieved with Stakeholder Analysis?

Stakeholder analysis yields useful and accurate information about those persons and organizations that have an interest in health reform. This information can be used to provide input for other analyses; to develop action plans to increase support for a reform policy; and to guide a participatory, consensus-building process.

To increase support or build consensus for reform, policymakers and managers must take additional steps following the stakeholder analysis. In the next phases of the policy process—constituency-building, resource mobilization, and implementation—policymakers and managers should use the information generated by the stakeholder analysis to develop and implement strategic communication, advocacy, and negotiation plans. The other sections of this toolkit can be used to guide the development and implementation of such plans (see, for example, Section 3: Advocacy Guidelines, and Section 4: Conflict Negotiation Guidelines).

Stakeholder Analysis Guidelines

Introduction

In developing this document, Partnerships for Health Reform (PHR) addresses one aspect of managing the "politics" of the reform process: the need for information on key players who have an investment in proposed reforms. This is particularly important at the policy formulation and legitimation phase of the policy process (see Figure 2.1). Policymakers and managers can use stakeholder analysis to identify these key players or "stakeholders," predict whether they might support or block the implementation of health reforms, and develop strategies to promote supportive actions and decrease opposing actions *before* attempting to implement major reform at the national, regional, local, or facility level.

The purpose of this document is to help policymakers, managers, and their working groups follow an "objective" and systematic process for collecting and analyzing data about key health reform stakeholders. It should be noted, however, that even the application of the systematic methodology incorporated into these guidelines cannot prevent the information from being somewhat subjective since stakeholder analysis is based on what stakeholders communicate to analysts. These guidelines, however, do include suggestions for checking the consistency of answers and other mechanisms to ensure that the information is obtained and analyzed as objectively as possible.

This document was developed using a thorough review of the literature on stakeholder analysis, political mapping, and policy process, as well as PHR field experience in conducting stakeholder analyses. (Health reform stakeholder analyses were conducted with PHR support in Ecuador and India.) The resulting document, therefore, includes instructions and tools that are supported by both academic theory and real-world application.

These guidelines incorporate a methodology that yields useful and accurate information on health reform stakeholders (and can be followed even when conducting a stakeholder analysis with limited time or resources). The information resulting from the analysis can be used for the following:

- Provide input for other analyses (i.e., strategic planning, institutional assessment, broader political analyses)

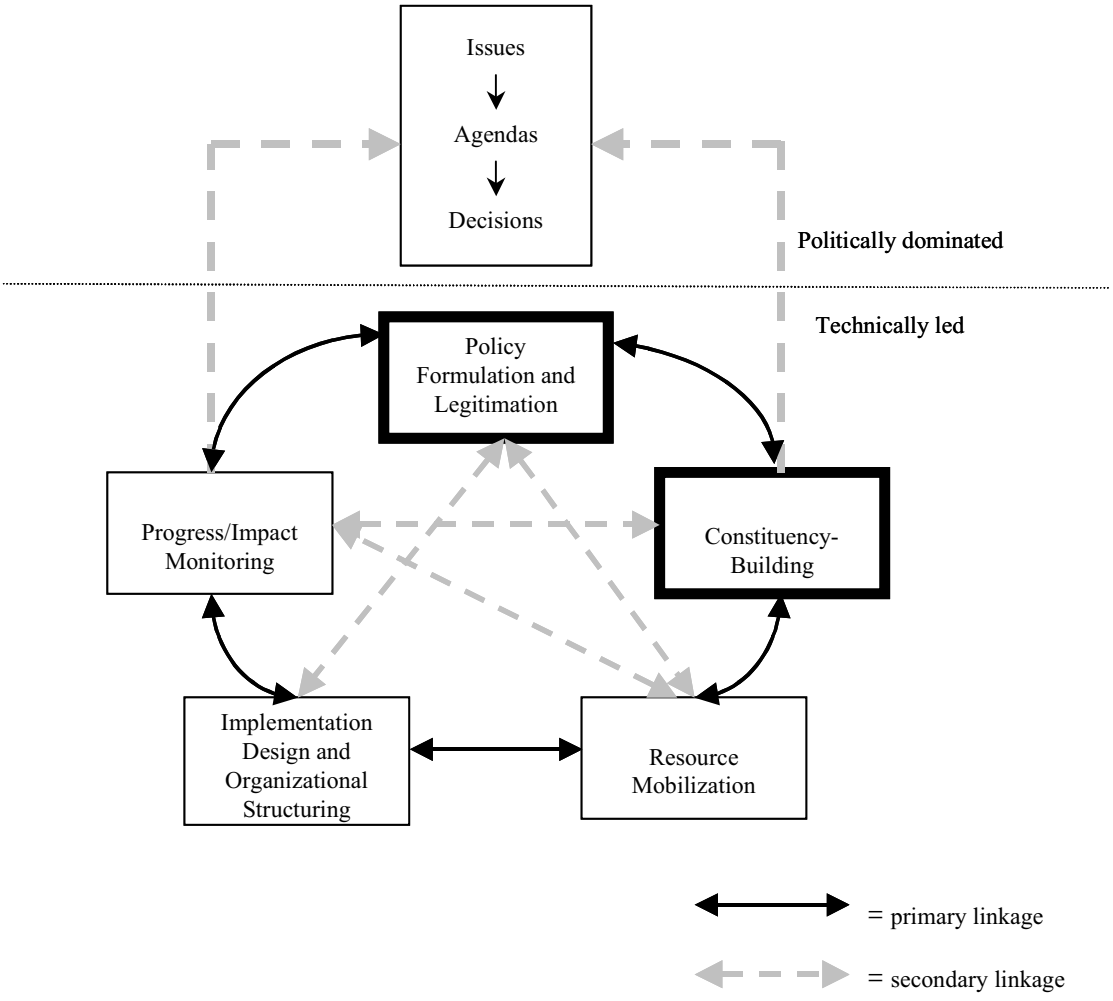
"Policy," as used in this document, refers to any national, regional, local, or institutional project, program, law, regulation, or rule.

- ▶ Develop action plans to increase support for a reform policy
- ▶ Guide a participatory, consensus-building process (by sharing the information obtained with the stakeholders and encouraging discussion about how to address the concerns of the opposition).

Application of these guidelines is intended to make policymakers and managers more informed about the political environment surrounding their reforms and better prepared to take action to ensure the full implementation of health sector reforms.

To increase support or build consensus for reform, policymakers and managers must take additional steps following the stakeholder analysis. In the next phases of the policy process—constituency-building, resource mobilization, and implementation (Figure 2.1)—policymakers and managers should use the information generated by the stakeholder analysis to develop and implement strategic communication, advocacy, and negotiation plans. The other sections of this toolkit can be used to guide the development and implementation of such plans (see, for example, Section 3: Advocacy Guidelines, and Section 4: Conflict Negotiation Guidelines).

Figure 2.1. The Policy Process



Step 1: Planning the Process

Define the purpose of the analysis, and identify uses for the results.

The first step in conducting a stakeholder analysis is to define the purpose of the analysis, identify the potential users of the information, and devise a plan for using the information. A discussion of these issues should be led by the "sponsor," or initiator, of the stakeholder analysis.

As noted above, information generated from stakeholder analysis may serve several purposes: to provide input for other analyses; to inform the development of action plans to increase support for a reform policy; or to guide a participatory, consensus-building process.

Other activities, such as strategic planning, institutional assessments, or application of computerized programs like PolicyMaker,[1] often require the type of information produced by a stakeholder analysis—who the stakeholders are, what their positions are related to a policy, how important they are, and so forth. It may be useful, therefore, to conduct a stakeholder analysis in conjunction with these activities.

Policymakers and managers may use the results of a stakeholder analysis to develop their action plans. These plans should identify concrete actions, and possibly "behind the scenes" activities, that the policymakers and managers will implement to increase stakeholder support.

Finally, policymakers and managers may use the results in open discussions with stakeholders in an effort to build consensus. This allows stakeholders to see where they are relative to others and encourages discussion on how to address the opposition's concerns. This may be useful when the number of stakeholders is small and manageable and when consensus-building is a stated goal of the analysis.

Before proceeding with the next steps, the sponsor should ensure that a consensus exists among the policymakers as to the purpose of the analysis, its proposed users, and the intended use of the results.

Identify and train a working group.

The sponsor of the activity should form a small "working group" (two to four people) whose members will be the interviewers and analysts for the stakeholder analysis. The sponsor may guide the process and serve as a point of reference, or he or she may be a member—even the leader—of the working group.

Whenever possible, the working group should represent distinct interests and organizations. This helps prevent the type of biases that can occur when a single person or institution conducts an analysis. Having members with differing points of view can also be helpful in interpreting the qualitative and, at times, ambiguous data that emerge. If possible, the group should include

1. PolicyMaker is a computer program (designed by Harvard University) that organizes stakeholder information, provides guidance on strategies to deal with the stakeholders, and creates effective visuals for presenting the information to policymakers.

a "neutral" person who has no political or other interest in the policy and who is independent of the institution promoting the policy. It is also useful to include members who are knowledgeable about the sector, stakeholders, context, and politics related to the policy.

The stakeholder analysis process should be participatory, involving all members of the working group from beginning to end. This way, all working group members will be integrated into the entire process and will gain the experience needed to conduct similar efforts in the future. Integrating all working group members into the process also will increase their understanding of and support for the results and help them accurately translate the interview responses into analysis results.

It is important that members of the working group are experienced as interviewers and are able to elicit answers to the stated questions without imposing their personal biases. If they have no previous experience, a day or two of training may be required (such as practice interviewing through role playing). The working group members also should be able to review and accurately synthesize qualitative information. In addition, all members of the group should read these stakeholder analysis guidelines, receive training on the content of stakeholder analysis, and understand the reason for undertaking the analysis.

Develop a plan and timeline.

Finally, the working group should identify the specific steps to be taken in conducting the analysis (following these guidelines) and establish a timeline for the process. The timeline should include all major steps in the process, up to and including the final presentation of conclusions to policymakers. Sufficient time should be allocated for setting up interviews and rescheduling them in case of cancellations.

Step 2: Selecting and Defining a Policy

Select an appropriate policy.

For a stakeholder analysis to be useful, it must be focused on a specific policy or issue. Again, policy is used in this document to refer to any national, regional, local, or institutional project, program, law, regulation, or rule. In most cases, the sponsor of the stakeholder analysis will have identified a policy, but it is important to ensure that the policy in question is an appropriate topic for a stakeholder analysis before the process begins.

The following are some basic criteria for evaluating the appropriateness of health reform policies as subjects of a stakeholder analysis:

- The policy should be specific and "definable." Policymakers and managers should avoid conducting an analysis on a policy that has not been thought through or is too general to be defined in concrete terms. This is important to ensure that specific interview questions and responses can be developed around the policy.
- The policy should be socially and politically controversial so that it merits the investment of resources required to determine what aspects are controversial and to whom.
- The policy should be key to current reform efforts and important enough to justify the resources that will be needed to implement recommended actions that emerge from the analysis.

Box 2.1. Sample policies

Appropriate for analysis
- Deconcentration of the ministry of health (MOH)
- Resource allocation based on production
- Hospital autonomy/decentralization
- New budgeting mechanisms at the hospital level

Not appropriate for analysis
- Health sector reform (too general)
- Modernization of the MOH (too general)
- Providing computers for all MOH offices (not a central or priority health reform topic)
- Increasing national spending on health (may not be a controversial topic for the health sector)

Define the policy.

Once a policy is chosen for the stakeholder analysis, the working group should work with policymakers to define the main ideas and concepts. The basic ideas, not the details of the policy, will need to be explained to the stakeholders later in the process, and simple, concise definitions will be required.

Box 2.2. Sample health reform policy definitions

Deconcentration of the MOH: the permanent delegation of decision-making power to provincial directors, area chiefs, and hospital directors in:
- naming and managing personnel
- buying equipment and supplies
- utilizing funds generated by the facilities.

MOH resource allocation based on results: to provide resources to ministry facilities based on the volume of services they provide and whether they meet client needs. The specific resources that would be allocated based on results include:
- facility and general administrative budgets
- personnel allocations
- equipment distribution.

Step 3: Identifying Key Stakeholders

Identifying the key stakeholders is extremely important to the success of the analysis. Based on the resources available, the working group should decide on the maximum number of stakeholders to be interviewed. The working group should then follow the steps below to define the list of stakeholders (beginning with an open list that can be reduced, if necessary).

Compile and review existing information.

The working group should gather and analyze any written documents related to the selected policy. This will help to identify potential stakeholders and, perhaps, their connection to the policy.

Box 2.3. Potential stakeholder groups

For a national-level health reform policy
- MOH (central, regional, local, facility levels)
- Ministry of finance
- National institute of social security
- National labor unions
- Health facility directors
- For-profit/nonprofit health organizations
- Politicians
- International donors
- Organized community groups

For a facility-level health reform policy
- MOH central or regional (oversight body)
- Ministry of finance (source of funding)
- National unions connected with facility
- Facility director or manager
- Facility board
- Facility doctors
- Facility nurses
- Facility nonmedical staff
- Facility labor union representatives
- Users/organized community groups

Develop a list of all possible stakeholders.

Initially, the working group should identify all actors who could have an interest in the selected policy, including actors outside the health sector that could affect or be affected by the policy. Specific stakeholders can be identified from the following sectors: international/donors, national political (legislators, governors), public (ministry of health [MOH], social security agency, ministry of finance), labor (unions, medical associations), commercial/private for-profit, and nonprofit (nongovernmental organizations [NGOs], foundations). Civil society is an important sector to consider if the community or consumers have a direct interest in the policy. It is also important to consider the potential stakeholders in different geographic or administrative areas within one organization.

Develop a list of priority stakeholders with input from experts.

Since resources, time, and finances for the analysis will be limited, the list of stakeholders to be interviewed must be prioritized. Experts who know the sector, policy, and players can help in this process.

The working group should consult with two to three persons who have extensive knowledge of the health sector, its actors, and the power of those actors to influence the policy. Experts could be representatives from donor organizations, health reform projects, a national health council, private consulting firms that have worked in health, or other sector-wide organizations. They could also be persons who have worked in various positions in the health sector, such as ex-MOH authorities. Ideally, these experts should not be stakeholders themselves.

Two working group members should meet with the experts to identify potential stakeholders from the various sectors. The discussion should focus on persons or organizations that may be

related to or affected by the particular policy and that have the ability to affect the implementation of the policy.

The working group also should ask experts about the availability of written information, including specific stakeholder statements related to the policy. Such written documents may not provide the working group with all the information necessary to identify the most appropriate stakeholders, but they will make the working group selections more informed.

Using the experts' input, the working group should prioritize the list of potential stakeholders to include only those individuals who have a direct interest in the policy and could affect its implementation. Actors who are not organized or do not have the ability to affect the specific policy should not be included.

Annex 2-A lists the general groups from which stakeholders for a health financing policy may be identified, as well as justifications for their inclusion. This list may vary by country and policy, but including a justification for the inclusion of stakeholders ensures that only those directly related to the policy are selected.

Once the stakeholders are chosen, the working group should develop a contact list, with the stakeholders' names, addresses, and phone numbers.

Step 4: Adapting the Tools

Generally, very little secondary information is available on stakeholders. As a result, the working group should plan to interview the priority stakeholders identified to gain accurate information on their positions, interests, and ability to affect the process.

The following tools can be used for gathering and analyzing this information:

- Definitions of stakeholder characteristics (See Annex 2-B)
- Stakeholder table (See Annex 2-C)
- Interview questionnaire and protocol (See Annex 2-D)
- Reference chart (See Annex 2-E)

The working group should review and adapt these tools to fit the specific policy being analyzed and the policymakers' information needs.

Adapt stakeholder characteristics.

The working group should define the exact stakeholder information or characteristics to be considered. The following characteristics are usually included for each stakeholder (each of these terms is defined further in Annex 2-B):

- I.D. number (given to the stakeholder on the questionnaire)
- Position and organization
- Internal/external: internal stakeholders work within the organization that is promoting or implementing the policy; all other stakeholders are external.
- Knowledge of policy: the level of accurate knowledge the stakeholder has regarding the policy under analysis, and how each stakeholder defines the policy in question. This is important for identifying stakeholders who oppose the policy due to misunderstandings or lack of information.
- Position: whether the stakeholder supports, opposes, or is neutral about the policy, which is key to establishing whether or not he or she will block the policy implementation
- Interest: the stakeholder's interest in the policy, or the advantages and disadvantages that implementation of the policy may bring to the stakeholder or his or her organization. Determining the stakeholder's vested interests helps policymakers and managers better understand his or her position and address his or her concerns.
- Alliances: organizations that collaborate to support or oppose the policy. Alliances can make a weak stakeholder stronger, or provide a way to influence several stakeholders by dealing with one key stakeholder.
- Resources: the quantity of resources—human, financial, technological, political, and other—available to the stakeholder and his or her ability to mobilize them. This is an important characteristic that is summarized by a power index and will determine the level of force with which the stakeholder might support or oppose the policy.

- Power: the ability of the stakeholder to affect the implementation of the health reform policy.
- Leadership: the willingness to initiate, convoke, or lead an action for or against the health reform policy. Establishing whether or not the stakeholder has leadership will help policymakers and managers target those stakeholders who will be more likely to take active steps to support or oppose the policy (and convince others to do so).

The working group should review and adapt the characteristics and definitions provided in Annex 2-B to the policy being analyzed and the particular culture of the country. It is crucial to ensure that each member of the working group understands the meaning of the final definition for each characteristic.

Once the terms have been defined, a stakeholder analysis table can be created in a wordprocessing application or in a spreadsheet. (A sample analysis table created in Microsoft Excel is provided in Annex 2-C.) The table should list stakeholder characteristics across the top row (see Table 2.1). This title row may vary depending on the exact characteristics and their definitions.

Table 2.1. Stakeholder Characteristics and Table Titles (full table in Annex 2-C)

D		E				F	G	H		I	J
Knowledge		Position				Interests	Alliances	Resources		Power	Leader
1	2	1 Self	2 Others		3 Final	Advant./	Organizations	1	2 Ability to	Resources	Yes
Level	Definition	S, MS,	S, MS,	I.D.	S, MS,	disadvant.	mentioned	Quantity	mobilize	average	No
3,2,1		N, MO, O	N, MO, O	#	N, MO, O			3,2,1	3, 2, 1	3, 2, 1	

Develop the interview questionnaire.

Once the working group has chosen and defined key stakeholder characteristics, a standard questionnaire should be developed for interviewing stakeholders. The stakeholders should not complete the questionnaire themselves, but the interviewer should use the questionnaire to guide the conversation during the interview.

In developing the questionnaire, the working group should decide the most appropriate way to obtain the necessary information, given the cultural context. Asking direct questions may seem the most efficient method but could result in unreliable answers because the stakeholders may not be accustomed to communicating in such a direct and candid manner. Questions should be clearly stated, specific, and open-ended wherever possible, requiring the stakeholder to provide more than a simple "yes" or "no" answer. If necessary, several questions may be asked to obtain information on one characteristic, but doing this repeatedly runs the risk of extending the interview beyond the ideal 2-hour time limit. (See the section below on "Develop the interview protocol.")

The questionnaire also should include an introductory section that the interviewer can read to each stakeholder (see Annex 2-D). This introduction should state the objective of the interview, identify who is collecting the information, explain what will be done with the information,

and assure the stakeholder that all responses will remain anonymous. The definition of the policy under analysis and any terms that might be ambiguous or unknown to the stakeholder should be explained during the interview. Such definitions and clarifications, however, should be provided only after the interviewer has explored and established the stakeholder's level of understanding and knowledge of the policy in question.

The following section on interview protocol suggests a few more tips for improving the interview process.

Develop the interview protocol.

The working group should discuss and document the protocol to be followed during the interview process. This protocol, and any other "rules" that the working group considers important to ensure the collection of consistent and accurate data, should be established in advance. To ensure consistency and objectivity, the following protocol is suggested:

- Two-person interview teams should be used, with the interviewers representing different organizations whenever possible.
- Both interviewers should take notes, but only one should lead the interview.
- Questions should be asked no more than twice; if the stakeholder still does not provide an answer, the interviewer should move on.
- The interview should be terminated at the stakeholder's request, even if questions remain.
- Immediately following the interview, the interviewers should type their notes into one electronic questionnaire per stakeholder. (Interviewers should enter each answer under its corresponding question in the electronic questionnaire.)
- The information should be entered in the same words the stakeholder used.

As part of the protocol, each questionnaire should have a place for the interviewer to fill out the name and ID number for the stakeholder being interviewed and the date and city of the interview (see Annex 2-D). All interviewers should be clear on how to adhere to the protocol before beginning the interviews.

Test the questionnaire.

Before interviewing the stakeholders, the working group should pretest the questionnaire by conducting interviews with nonpriority stakeholders (i.e., those who were on an initial list but were cut when the list was shortened). A pretest should be conducted to determine whether:

- Interviewers are comfortable with the questionnaire
- The interviewee understands the questions
- Answers provide the information required for filling in the analysis table (the table should be filled in for the pre-test interviews)
- The interview does not take more than 2 hours
- Interviewers successfully adhere to the established protocol

After analyzing the results of the pretest, the questionnaire and protocol should be modified, if necessary, before proceeding with the priority stakeholder interviews.

Develop the reference chart.

The final tool needed is the information transfer reference chart or "reference chart" (Annex 2-E). This chart serves two purposes:

- to provide a means of checking that all the stakeholder characteristics are covered in the interview questionnaire
- to aid the working group in transferring the information from the questionnaire to the stakeholder table.

The reference chart should be developed *after* the interview questionnaire and the stakeholder table because it incorporates specific interview questions and the column titles used in the stakeholder table (see Table 2.2). The working group also should identify the specific interview questions that will yield the information for each column of the stakeholder analysis table. Both the completed interview questionnaires and the definitions should be used when information is transferred to the analysis table to ensure that the stakeholders' responses are recorded accurately and objectively. The reference chart should be pretested along with the interview questionnaire to ensure that the correct question reference numbers appear beneath each column on the stakeholder table.

Table 2.2. Reference Chart (question numbers that pertain to each column on the stakeholder table)

C	D		E				F	G	H	
Intern/	Knowledge		Position				Interests	Alliances	Resources	
Extern I E	1 Level 1, 2, 3	2. Definition	1. Self S, MS, N, MO, O	2. Others S, MS, N, MO, O	2. Others I.D. #	3. Final S, MS, N, MO, O	Advant./ Distadvant.	Organizations mentioned	1. Quantity 3, 2 , 1	2. Ability mobilize 3, 2, 1
According to their position	#1 #2 #3	#3	#6 #7 #8 #9 or #6 #10 #11 #12	#13 #14 #15 #16		Analysis of self and others info. review interests info. for strength of position	#4 #5 #7 #9 or #4 #5 #10 #12	#8c #8e #8g or #11c #11e #11g	#8a #8f or #11a #11f	#8a #8b #8c #8d or #11a #11b #11c #11d

Step 5: Collecting and Recording the Information

Review existing information.

Before beginning the interviews, the working group should gather and review secondary information on the priority stakeholders. This information should be more detailed than the information that was reviewed in Step 3. It should include any written or spoken statements regarding the stakeholders' positions on the policy, any goals or objectives of the organizations the stakeholders represent, the position of the stakeholders within their organizations (with specific reference to the stakeholders' control over resources), and any data on the quantity or type of resources available to the stakeholders or their organizations.

Box 2.4. Possible secondary information sources

- Newspapers
- Institutional reports and publications
- Speeches
- Political platforms
- Organization annual reports, staff size, and/or number of offices
- Expenditure data (National Health Accounts)
- Other studies and opinion polls

Make interview appointments.

As noted under Step 3, very little secondary information is generally available on stakeholders, and the working group will likely have to interview all of the stakeholders from the final list. Even if there is an abundance of secondary information, the working group may choose to interview all stakeholders to gain more insight into their opinions on the policy and other stakeholders.

To begin the process, interview appointments should be made with each stakeholder. Ideally, appointments should be made 1-2 weeks in advance by the working group member(s) with enough influence to secure appointments with high-level and busy stakeholders. If necessary, the group should seek assistance from the sponsor or policymaker who is supporting the process.

The interviews should be scheduled at the time and place most convenient for the stakeholder. All attempts should be made to secure an interview with the person indicated and not his or her representative. This includes rescheduling cancelled appointments, if necessary.

To interview stakeholders who work in a region outside the working group's base city, two working group members should travel to the region and interview any and all stakeholders from that region. This trip should be planned well in advance to ensure the availability of all stakeholders. A second option, if the working group does not have travel funds, is to meet with the stakeholder when he or she may be in the working group's base city. If neither travel nor a stakeholder visit to the base city is possible, the working group can interview the stakeholder by telephone. The telephone interview should be a conference call involving two interviewers.

Conduct interviews and record notes.

The interviewers should follow the protocol established by the group, with one person as the principle interviewer responsible for leading the conversation. Although the interviewer can

attempt to clarify the interviewee's statements, he or she should not try to summarize responses. If the stakeholder does not understand a question, the interviewer can rephrase the question slightly, but any deviations from the original questionnaire should be noted. After two attempts to ask and/or rephrase a question, the interviewer should move on.

Immediately following the interview, the two-person interview team should work together to enter the stakeholder's answers for each question into the computer. A separate electronic file should be created for each stakeholder that contains the questionnaire and his or her answer to each question. These answers should be recorded as literally as possible, without summarizing what the stakeholder was "trying" to say. The objective of this follow-up process is to record the information accurately, legibly, and by question number for use in the analysis process.

Step 6: Filling in the Stakeholder Table

This step of the process involves taking detailed and often lengthy answers from the interviews and arranging them into a more concise and systematized format (for anonymity and to highlight the most significant information). By doing this, the working group can eventually develop clear comparisons among the different stakeholders and concisely present this information to the policymakers who will use it (see Steps 7 and 8). To conduct such comparisons and analyses, the interview responses must first be translated into the stakeholder table. Accurately transferring interview responses to the table requires that the working group use all of the tools developed: the completed interview guides for each stakeholder, the reference chart, the definitions, and the stakeholder table.

It is useful to have those working group members who served as interviewers participate in this process because they can generally recall the context within which certain stakeholders' statements were made. Group members should analyze the exact responses written in each stakeholder's questionnaire, however, and should not rely on their memory.

During the process of adapting the tool, the working group should include, with each definition, an explanation of how to fill in the stakeholder table for each term. These instructions are included in the definitions provided in Annex 2-B, but the process for translating the more complex characteristics, such as position and power, is detailed below.

Determine the stakeholders' position.

The position of each stakeholder can be established by analyzing the following:

- Information directly reported by the stakeholder in the interviews
- Indirect information gathered through other stakeholders and secondary information (i.e., others'perceptions)
- Interest information.

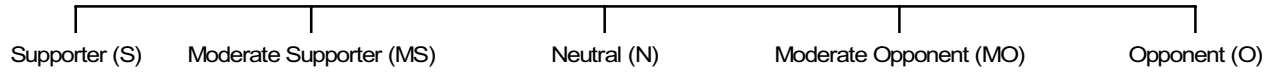
To obtain indirect information, each stakeholder interview must include specific questions about that stakeholder's opinions of others (see questions 13 to 17 in the Sample Stakeholder Interview Questionnaire, Annex 2-D). Any such opinion should be entered in the stakeholder table (Annex 2-C) in the row relating to that designated stakeholder and in the column for "others" column (column E2, as shown in Table 2.3.)

Table 2.3. Column E of Stakeholder Table

E			
Position			
1. Self	2. Others		3. Final
S, MS, N, MO, O	S, MS, N, MO, O	I.D. #	S, MS, N, MO, O

A stakeholder's positions should be classified in columns E1, E2, and E3, using the established definitions for positions. The full spectrum of position classifications is presented in Figure 2.2. If desired, low supporter (LS) and low opponent (LO) can be added, but the information gathered usually does not allow for such a detailed disaggregation.

Figure 2.2. Spectrum of Stakeholder Positions



When determining the final position of each stakeholder (column D3), the working group needs to reconcile any differences between the position that is self-reported (E1) and the position that is perceived by others (E2). Differences can be resolved in the following manner:

- When the stakeholder states that he or she is against the policy, this is assumed to be accurate, albeit subjective, information because there is little incentive for the stakeholder to misrepresent his or her position. For moderate opponents (MO) or opponents (O), self-reporting should determine the stakeholder's final position.
- In the case of the self-reported neutral or supportive stakeholder, it is important to cross-reference the opinions of others because the stakeholder may have an incentive to misrepresent his or her position.

When a discrepancy exists between the stakeholder's self-reported position and that perceived by others, the working group must consider the relative weight of available information. This includes the number of other stakeholders who disagree with the self-reported position, whether the stakeholder in question is perceived to be moderately or strongly opposed to the policy, and any knowledge of the stakeholder's past actions relative to similar policies.

If considered carefully, deciding on the basis of "majority rules" is a possible method for resolving position discrepancies. There must always be a balance, however, so that a person who is in full support of the policy is not moved to a nonsupporting position unless the decision is unanimous on the part of all other stakeholders interviewed. For example, if a stakeholder who self-declares support for a policy is perceived to be against the policy by five other stakeholders, and one other stakeholder perceives the principal stakeholder as neutral, the working group could classify the stakeholder in question as moderately opposed (considering the 5 to 2 majority and the lack of unanimity on the part of other stakeholders).

The information in the interests column of the stakeholder table (column F) also can help establish the final position (particularly when deciding between a moderate or full supporter/opponent, or between conflicting perceptions). The interests column identifies any advantages or disadvantages of the implementation of the policy as stated by the stakeholder. If a stake-

holder provides very general or ambiguous answers to these questions, it may indicate that he or she is not strongly invested in the position stated or was not candid in his or her response to the question.

Fill in the resources column and create a power index for each stakeholder.

Since the main source of a stakeholder's power is his or her resources and ability to use them, the power index is derived from analyzing the two resource columns in the stakeholder table. Therefore, in order to fill in the "power" column for each stakeholder, the working group must first define the resource columns for each stakeholder according to the definition.

Resources: "a source of support or aid" (Webster). Resources can be of many types—human, financial, technological, political, and other.

The resource category is divided into two parts: the quantity of resources that a stakeholder has within his or her organization or area and the ability to mobilize those resources.

Analysts should classify the quantity of resources as follows: 3 = many, 2 = some, 1 = few, and insert the appropriate number into column H1 of the stakeholder table. The ability of the stakeholder to mobilize resources should be quantified in terms of the following:

- 3 = the stakeholder can make decisions regarding the use of the resources in his or her organization or area
- 2 = the stakeholder is one of several persons that can make decisions regarding the use of resources
- 1 = the stakeholder cannot make decisions regarding the use of the resources.

This score should be inserted into column H2 (see Table 2.4).

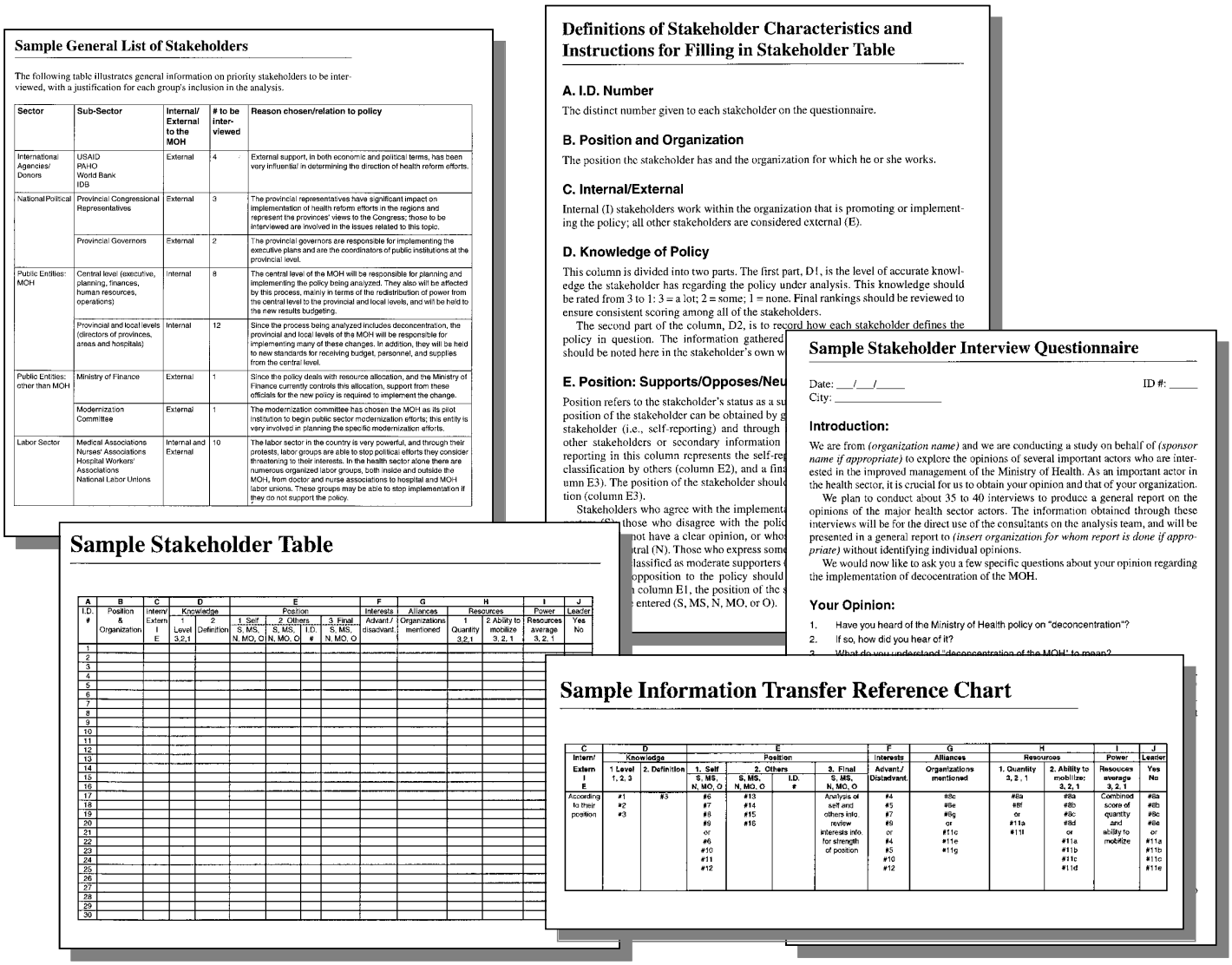
Table 2.4. Columns H and I of Stakeholder Table

H		I
Resources		Power
1. Quantity 3, 2 , 1	2. Ability to mobilize: 3, 2, 1	Resouces average 3, 2, 1

Since "power" is defined here as the combined measure of the amount of resources a stakeholder has and his or her capacity to mobilize them, the two resource scores for each stakeholder should be averaged, resulting in a power index between 3 and 1: 3 = high power, 2 = medium power, and 1 = little power. The final rankings should be reviewed to ensure consistent scoring among all of the stakeholders.

Power: "the capacity or ability to accomplish something…strength, force or might" (Webster). Here, the ability to affect the implementation of the health reform policy due to the strength or force he/she possesses.

Figure 2.3. Use All Tools in Filling in the Analysis Table (See Annexes for full versions)



Sample General List of Stakeholders

The following table illustrates general information on priority stakeholders to be interviewed, with a justification for each group's inclusion in the analysis.

Sector	Sub-Sector	Internal/ External to the MOH	# to be interviewed	Reason chosen/relation to policy
International Agencies/ Donors	USAID PAHO World Bank IDB	External	4	External support, in both economic and political terms, has been very influential in determining the direction of health reform efforts.
National Political	Provincial Congressional Representatives	External	3	The provincial representatives have significant impact on implementation of health reform efforts in the regions and represent the provinces' views to the Congress; those to be interviewed are involved in the issues related to this topic.
	Provincial Governors	External	2	The provincial governors are responsible for implementing the executive plans and are the coordinators of public institutions at the provincial level.
Public Entities: MOH	Central level (executive, planning, finances, human resources, operations)	Internal	8	The central level of the MOH will be responsible for planning and implementing the policy being analyzed. They also will be affected by this process, mainly in terms of the redistribution of power from the central level to the provincial and local levels, and will be held to the new results budgeting.
	Provincial and local levels (directors of provinces, areas and hospitals)	Internal	12	Since the process being analyzed includes deconcentration, the provincial and local levels of the MOH will be responsible for implementing many of these changes. In addition, they will be held to new standards for receiving budget, personnel, and supplies from the central level.
Public Entities: other than MOH	Ministry of Finance	External	1	Since the policy deals with resource allocation, and the Ministry of Finance currently controls this allocation, support from these officials for the new policy is required to implement the change.
	Modernization Committee	External	1	The modernization committee has chosen the MOH as its pilot institution to begin public sector modernization efforts; this entity is very involved in planning the specific modernization efforts.
Labor Sector	Medical Associations Nurses' Associations Hospital Workers' Associations National Labor Unions	Internal and External	10	The labor sector in the country is very powerful, and through their protests, labor groups are able to stop political efforts they consider threatening to their interests. In the health sector alone there are numerous organized labor groups, both inside and outside the MOH, from doctor and nurse associations to hospital and MOH labor unions. These groups may be able to stop implementation if they do not support the policy.

Definitions of Stakeholder Characteristics and Instructions for Filling in Stakeholder Table

A. I.D. Number

The distinct number given to each stakeholder on the questionnaire.

B. Position and Organization

The position the stakeholder has and the organization for which he or she works.

C. Internal/External

Internal (I) stakeholders work within the organization that is promoting or implementing the policy; all other stakeholders are considered external (E).

D. Knowledge of Policy

This column is divided into two parts. The first part, D1, is the level of accurate knowledge the stakeholder has regarding the policy under analysis. This knowledge should be rated from 3 to 1: 3 = a lot; 2 = some; 1 = none. Final rankings should be reviewed to ensure consistent scoring among all of the stakeholders.

The second part of the column, D2, is to record how each stakeholder defines the policy in question. The information gathered
should be noted here in the stakeholder's own w

E. Position: Supports/Opposes/Neu

Position refers to the stakeholder's status as a su
position of the stakeholder can be obtained by g
stakeholder (i.e., self-reporting) and through
other stakeholders or secondary information
reporting in this column represents the self-re
classification by others (column E2), and a fin
umn E3). The position of the stakeholder shoul
tion (column E3).

Stakeholders who agree with the implement
those who disagree with the polic
not have a clear opinion, or whos
tral (N). Those who express some
lassified as moderate supporters
opposition to the policy should
column E1, the position of the s
entered (S, MS, N, MO, or O).

Sample Stakeholder Interview Questionnaire

Date: ___/___/_____ ID #: _____
City: _____

Introduction:

We are from *(organization name)* and we are conducting a study on behalf of *(sponsor name if appropriate)* to explore the opinions of several important actors who are interested in the improved management of the Ministry of Health. As an important actor in the health sector, it is crucial for us to obtain your opinion and that of your organization.

We plan to conduct about 35 to 40 interviews to produce a general report on the opinions of the major health sector actors. The information obtained through these interviews will be for the direct use of the consultants on the analysis team, and will be presented in a general report to *(insert organization for whom report is done if appropriate)* without identifying individual opinions.

We would now like to ask you a few specific questions about your opinion regarding the implementation of decocentration of the MOH.

Your Opinion:

1. Have you heard of the Ministry of Health policy on "deconcentration"?
2. If so, how did you hear of it?
3. What do you understand "deconcentration of the MOH" to mean?

Sample Stakeholder Table

A	B	C	D		E				F	G	H		I	J
I.D. #	Position & Organization	Intern/ Extern I E	Knowledge 1 Level 3,2,1	2 Definition	Position 1. Self S, MS, N, MO, O	2. Others S, MS, N, MO, O	I.D. #	3. Final S, MS, N, MO, O	Interests Advant./ disadvant.	Alliances Organizations mentioned	Resources 1 Quantity 3,2,1	2 Ability to mobilize 3, 2, 1	Power Resources average 3, 2, 1	Leader Yes No
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
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Sample Information Transfer Reference Chart

C	D		E				F	G	H		I	J
Intern/	Knowledge		Position				Interests	Alliances	Resources		Power	Leader
Extern I E	1. Level 1, 2, 3	2. Definition	1. Self S, MS, N, MO, O	2. Others S, MS, N, MO, O	I.D. #	3. Final S, MS, N, MO, O	Advant./ Distadvant.	Organizations mentioned	1. Quantity 3, 2 , 1	2. Ability to mobilize: 3, 2, 1	Resources average 3, 2, 1	Yes No
According to their position	#1 #2 #3	#3	#6 #7 #8 #9 or #6 #10 #11 #12	#13 #14 #15 #16		Analysis of self and others info. review interests info. for strength of position	#4 #5 #7 #9 or #4 #5 #10 #12	#8c #8e #8g or #11a #11f #11c #11e #11g	#8a #8f or #8d or #11a #11b #11c #11d	#8a #8b #8c and #8e or #11a #11b #11c #11e	Combined score of quantity and ability to mobilize	#8a #8b #8c #8e or #11a #11b #11c #11e

Step 7: Analyzing the Stakeholder Table

Once the stakeholder table is complete, the information needs to be "analyzed." Such an analysis should focus on comparing information and developing conclusions about the stakeholders' relative importance, knowledge, interests, positions, and possible allies regarding the policy in question.

From the information in the stakeholder table, the working group should be able to conclude the following:

- Who are the most important stakeholders (from a power and leadership analysis)?
- What is the stakeholders' knowledge of the policy?
- What are the stakeholders' positions on the specific policy?
- What do the stakeholders see as possible advantages or disadvantages of the policy (interest analysis)?
- Which stakeholders might form alliances?

The specific steps for developing these five analyses are detailed below.

Carry out a power and leadership analysis.

Although the intent in prioritizing the stakeholder list (see Step 3) was to select only those stakeholders with power and leadership, the first analysis is designed to use the information from the table to further prioritize the stakeholders within the selected group interviewed. This second prioritization, based on actual data and a more select group, allows policymakers and managers to focus resources on addressing the concerns of the most important of the priority stakeholders.

The "importance" of stakeholders is defined here as their ability to affect the implementation of the policy. Since power and leadership are the characteristics that determine a stakeholder's ability to affect or block the implementation of a policy, these two characteristics are the basis for the first "importance" analysis.

Power: Quantity of resources and ability to mobilize those resources for or against the policy.
Leadership: A willingness to initiate, convoke, or lead an action for or against the policy.

For this analysis, the working group should divide the stakeholders into three groups (see Table 2.5):

- Group 1: those who have leadership and high power (level 3)
- Group 2: those who have leadership and medium power (level 2)
- Group 3: those who do not have leadership but have high to medium power (level 2 or 3).

Table 2.5. Example Results of Power/Leadership Analysis

Group 1: Leadership & High (3) Power	Group 2: Leadership & Medium (2) Power	Group 3: No Leadership, But Medium or High (2 or 3) Power
Minister of Health	Local politicians	MOH provincial directors
Minister of Finance	Hospital directors in regions A & B	MOH central directors
Labor union A	Area directors in regions A & B	MOH Reform Project
Labor union B	Hospital Workers' Association	Regional organization
Workers' Association	Nurses' Association	International donor B
Medical Association	International donor A	

The above grouping is based on the premise that those with leadership and power will be most able to affect policy implementation, although powerful stakeholders who lack leadership may still be able to affect the implementation through their power alone.

Identify the stakeholders making up these three groups by organization rather than by name in order to preserve their anonymity. Each of the three groups should have a name (it could be simply group 1, 2, or 3).

Some of the stakeholders may not fit into any of these groups, i.e., they may have no leadership and low power. Such stakeholders may be removed from the analysis at this point so that attention can be focused on those stakeholders within the power/leadership priority groups. When a small number of stakeholders are being analyzed, or if the working group wants to represent all stakeholders in the power/leadership analysis, a fourth group can be added for those with no leadership and low power (level 1).

Analyze knowledge data.

The stakeholders' level of knowledge related to the policy is often of interest to policymakers and managers. This level of knowledge can be presented as a general conclusion, especially if it is similar for the majority of the stakeholders, or the stakeholders can be divided by their level of knowledge (1, 2, or 3). The latter option is useful for targeting a communication strategy for a specific group of stakeholders, namely those with the lowest knowledge of the policy. These stakeholders would appear in Group 1 for knowledge level.

The information found in the knowledge data can be crossed with the power/leadership analysis to highlight the importance level of the stakeholders with a low knowledge level. This cross-analysis will result in an even smaller priority group for targeting communication strategies.

The knowledge data also can be cross-referenced with the position of the stakeholders to determine if those opposed to the policy have a consistently low level of knowledge. This would indicate to the policymaker or manager promoting this policy that communicating or advocating the objectives and basic tenets of the policy could reduce the opposition.

Analyze stakeholders' positions.

In analyzing the position information from the table, the following aspects can be determined:

- Total number of supporters
- Importance of supporters (cross-reference with power/leadership analysis)
- Knowledge of supporters (cross-reference with knowledge data)
- Advantages and disadvantages of policy implementation to the supporters (cross-reference with interest data)
- Knowledge of whether these supporters are internal or external to the organization developing the policy (cross-reference with the internal/external classification)
- Support "clusters": stakeholders in the same sector who support the policy (cross-reference with organization information)
- Total number of opponents
- Importance of opponents (cross-reference with power/leadership analysis)
- Knowledge of opponents (cross-reference with knowledge data)
- Advantages and disadvantages of policy implementation to the opponents (cross-reference with interest data)
- Knowledge of whether these opponents are internal or external to the organization developing the policy (cross-reference with the internal/external classification)
- Opposition "clusters": stakeholders in the same sector who oppose the policy (cross-reference with organization information)
- Neutral stakeholders, their importance, knowledge, and interests

Although the working group can identify such conclusions directly from the analysis table, the development of a position map often helps analysts to pull out and organize the information needed to make conclusions. For example, support or opposition "clusters" can be easily identified on a position map. Step 8, Using the Information, discusses how to develop the position map. This may be useful to the working group in conducting the position analysis as well as in presenting the information to policymakers and managers.

Analyze interest data.

The interest data can be used either in conjunction with other analyses or alone as general conclusions. In cross-referencing the interest data with other data, the policy implementation advantages and disadvantages identified by the stakeholders can be used to explain their positions or to emphasize their knowledge of the policy (i.e., irrelevant advantages and disadvantages may represent a misunderstanding of the policy). The interest data also can be cross-referenced with the power/leadership data to indicate what the most important stakeholders may have to lose or gain from policy implementation.

When used by itself, the interest data can be presented as a list of the potential advantages and disadvantages the policy presents to the stakeholders. This is most useful if many stake-

holders identify the same advantages and disadvantages. In this case, the working group can identify the concerns of the majority of the stakeholders regarding policy implementation.

Analyze alliances.

Possible stakeholder alliances can also be identified from the table information. The alliances can be identified in two ways:

- by referring to the analysis table to see if stakeholders mentioned organizations that they would work with to demonstrate for or against the policy
- by referring to the position "clusters" (the stakeholders with similar positions and within the same organization or subsector). As previously stated, the "clusters" can be easily identified with the development of a position map.

The alliance information should be cross-referenced with the position data to identify those alliances that may be potential sources of support, as well as those that may work together to oppose the policy. The working group can suggest or encourage policymakers to develop specific strategies based on these key alliances, either to reinforce a potentially supportive alliance or to separate a potentially threatening alliance.

The alliance data can also be cross-referenced with the power/leadership analysis results to highlight those alliances that are potentially the most supportive or threatening to the policy implementation.

Develop additional results.

In addition to the information listed on the stakeholder table, other information gained from the interviews can be used to develop key results and conclusions. When transferring the information from the questionnaires to the table, the working group should note that the following information may be relevant:

- Stakeholders who were not included in the priority list but were mentioned often by those interviewed
- Stakeholders' global impressions of other stakeholders or their organizations
- Suggestions for the implementation of the policy
- Any expectations that the majority of the stakeholders have in relation to the policy process.

By analyzing information related to these areas, as well as the five basic analysis results previously mentioned, the working group can develop a list of conclusions or results to be presented to the policymakers.

The working group should then consider how this information could be presented or used within other analytical frameworks. The next section provides some guidance in this area.

Step 8: Using the Information

Using the information generated by the preceding analysis is an integral part of the stakeholder analysis process. The working group, by virtue of its role in information-gathering and analysis, is responsible for organizing, disseminating, and explaining the results in a way that will ensure that the sponsor or other policymakers and managers can use the information to *take action*.

The use of the information generated by the stakeholder analysis should be discussed during Step 1, Planning the Process, and should be reviewed again once the results have been analyzed. As mentioned, there are various ways to use the information from a stakeholder analysis—to provide input into other analyses, to develop action plans to increase support for a reform policy, or to guide a participatory, consensus-building process.

This section offers guidelines on how to present the results. If the policymakers and managers plan to use the results obtained through the stakeholder analysis to take concrete, and possibly "behind the scenes," actions to increase stakeholder support, only those persons involved in implementing the follow-up actions should be included in the presentation and discussion of the results. If the purpose of the presentation is to share the results to build consensus among the stakeholders, then all stakeholders should be invited to attend. Although these guidelines address general issues about presenting the results, if the sponsor or other policymakers plan to use the results to build consensus, they should work with professional facilitators to guide the discussion.

General Results Presentation Format

Two persons from the working group should be selected to make the presentation, and the remainder of the group should be available to help answer any questions that arise. A date should be set when the sponsor and other relevant policymakers or stakeholders can meet for at least a 2-hour presentation and discussion session.

The presentation may include a short introduction on the stakeholder analysis, but it should focus on the results of the analysis, not on the process. Since policymakers and managers must prioritize and focus on the most important information, the presentation should be a concise synthesis, not a review of all the information obtained or the entire stakeholder table. If the results will be presented for a consensus-building process, the key areas that the stakeholders will discuss should be presented.

The remainder of this section provides some suggestions for presenting key information.

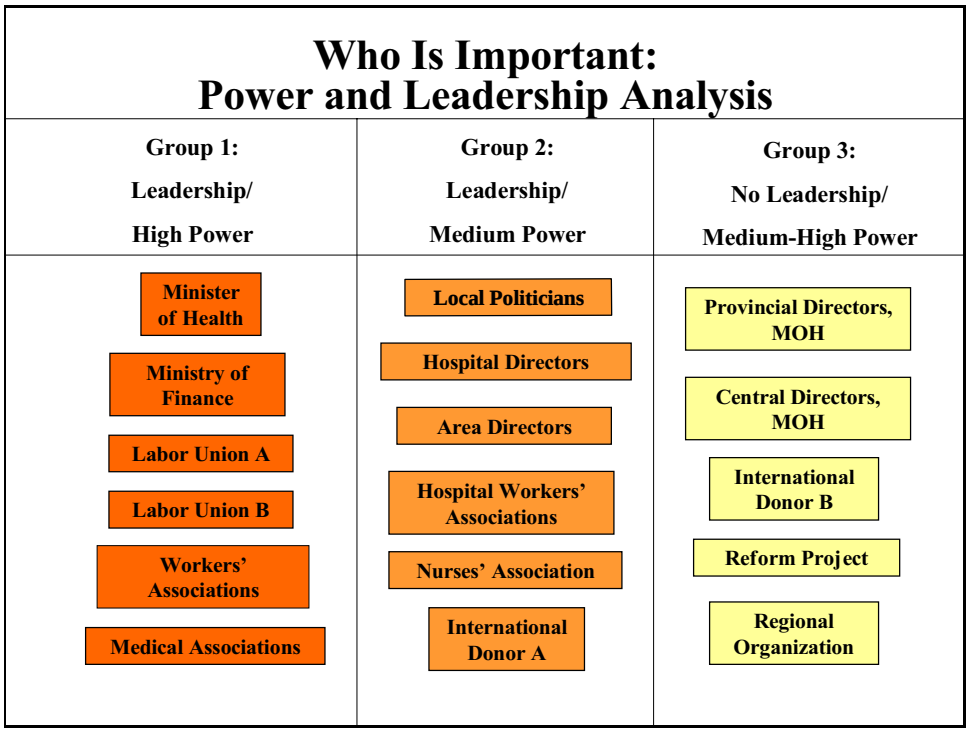
Presentation of Power/Leadership Analysis Results

Who is important?

One way to present the most important conclusions is to focus the presentation on the three groups that emerged from the power/leadership analysis, i.e., the first finding from the analysis. The three groups can be presented as organizations that have the potential to affect the success of the policy.

Microsoft PowerPoint® is an effective tool for such a presentation because it has colored squares that can be used to represent the power/leadership level of each stakeholder consistently throughout the presentation. For visual emphasis, more intense colors can be used to represent higher power/leadership indexes, and, therefore, higher importance. For reasons of anonymity, the boxes should be labeled with organizations' names and not individual stakeholders' names or job titles. (See Figure 2.4.) Other visual aids may be used if PowerPoint® is not available.

Figure 2.4. Sample of How to Use PowerPoint to Present Power/Leadership Analysis Results

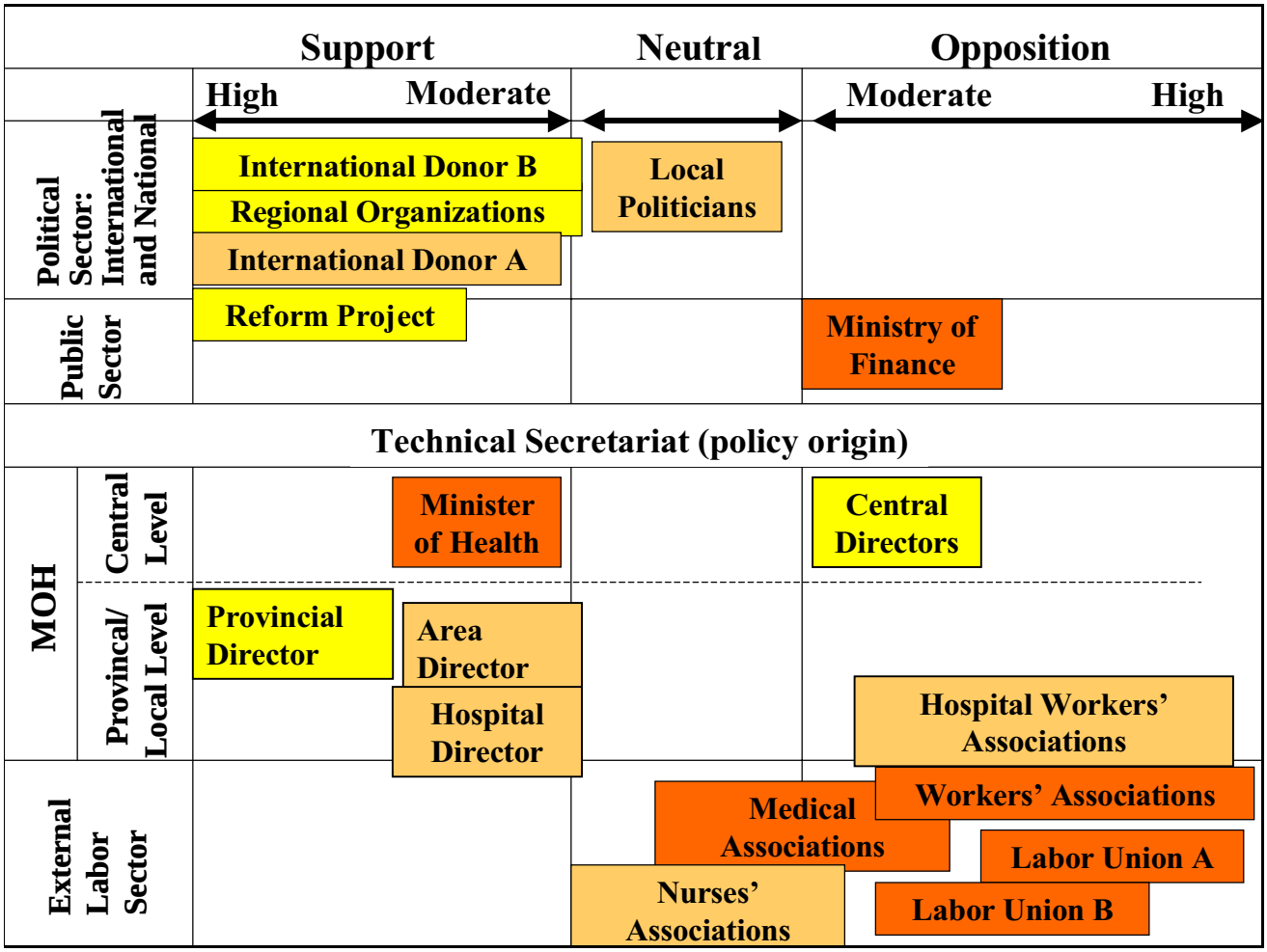


Presentation of Stakeholders' Positions

Where is the support/opposition?

The second finding—the supporting, neutral, or opposing positions of stakeholders—can be presented using a position map developed with PowerPoint® or other visual aids. The position map (see Figure 2.5) can quickly illustrate which actors support or oppose a policy, how important that support or opposition is (i.e., by color) to the success of the policy, and where these stakeholders are by sector. Colored boxes representing each actor from the three power/leadership groups should be placed on the map in accordance with the sector to which they belong (vertically) and their stakeholder position as established in the stakeholder table (horizontally).

Figure 2.5. Sample Position Map-in Color



Before the stakeholders can be located on the map, the map rows need to be labeled. The organization sponsoring the policy should be placed in the "policy origin" row (row in the center of the below map). The other rows should be labeled with the sector categories used in the stakeholder list (i.e., international/donor, national political, public, labor, etc.). The rows should be labeled in order of the proximity of the sector to the policy origin. For example, for a policy being developed by a centralized group in the MOH, the central MOH sector is closest to the policy origin and is given the row immediately adjacent to the policy origin row. In this example, the labor sector, which is external to the MOH and far from the direct influence of the policy developers, is placed farthest from the center row. Once all rows are labeled, the stakeholders can be placed within the row that represents their sector, or overlapping two rows if they act within two sectors.

In adapting the map, the column titles, which represent the positions of the stakeholders, should not need to be changed. In placing the colored boxes (i.e., stakeholders) on the map, those who are strong supporters (S) should be placed on the far left of the first column, while moderate supporters (MS) should be on the right side of the first column within the row that represents their sector. Those who are strong opponents (O) should be placed on the far right of the last column, while moderate opponents (MO) should be placed on the left side of the last column within their sector's row. Any neutral actors (N) should be placed in the middle column, in the row representing their sector.

If colored squares are used, the following conclusions can be presented:

- Total number of supporters
- Importance of supporters (cross-reference with power/leadership analysis)
- Whether these supporters are internal or external to the organization developing the policy (cross-reference with the internal/external classification)
- Support "clusters": stakeholders in the same sector who support the policy
- Total number of opponents
- Importance of opponents (cross-reference with power/leadership analysis)
- Whether these opponents are internal or external to the organization developing the policy (cross-reference with the internal/external classification)
- Opposition "clusters": stakeholders in the same sector who oppose the policy
- Neutral stakeholders and their importance.

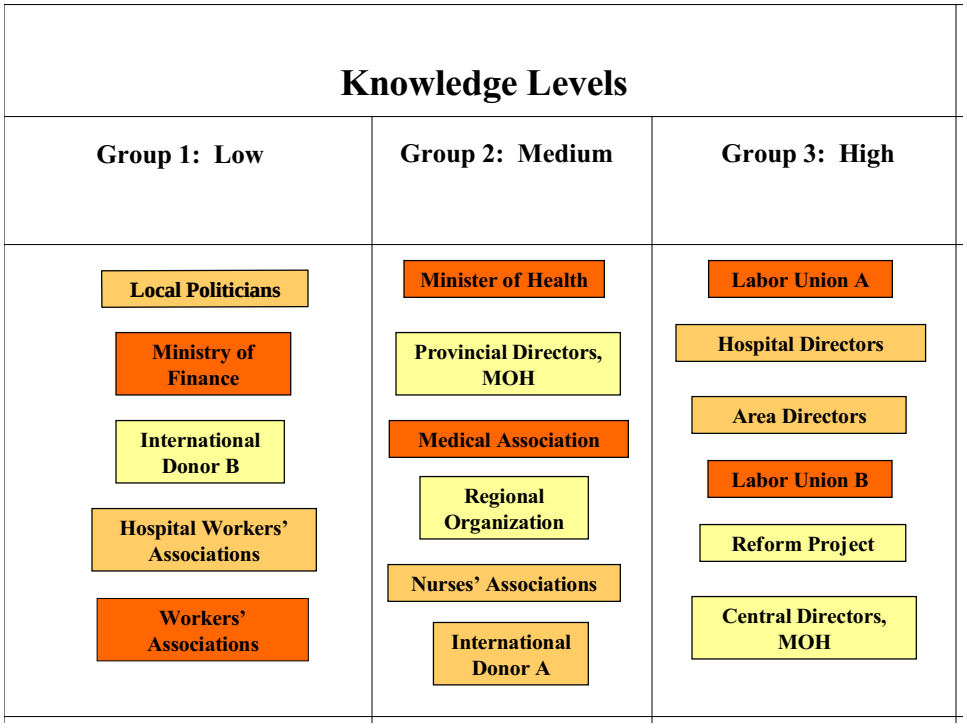
Since the knowledge and interest data cannot be represented on the map itself, the working group presenters can refer to these data when explaining the positions as seen on the map. They can also develop additional ways of presenting the knowledge and interest data as suggested below.

Presentation of Knowledge Data

As suggested in Step 7, the knowledge data can be presented in two ways: as a general conclusion, especially if the level of knowledge is similar for the majority of the stakeholders, or as a graphic representation of the three levels of knowledge.

The graphic representation of the three knowledge groups is particularly useful in cross-referencing the power/leadership information with the use of colored boxes. Using a slide similar to that seen in Figure 2.6, the working group presenters can highlight for the audience the level of knowledge of the most important stakeholders.

Figure 2.6. PowerPoint Presentation of Knowledge Data

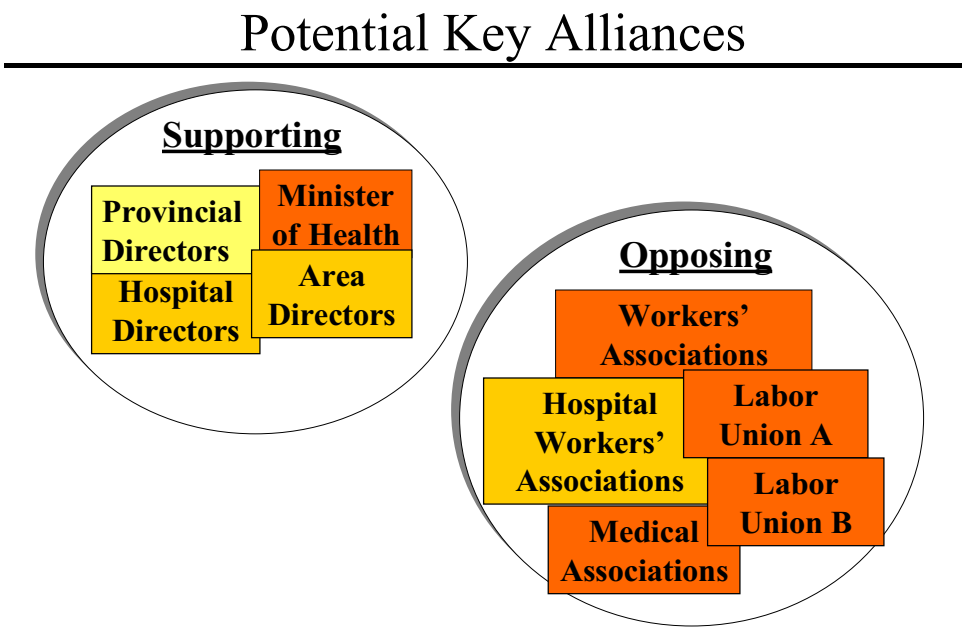


Presentation of Key Alliances

Who might work together?

Although alliances can be identified by "clusters" on the position map, the working group can identify additional alliances that are not evident on the position map. Since an audience often cannot simultaneously absorb all of the information presented on a map, presenters also may want to use a slide similar to the one shown in Figure 2.7 to emphasize alliances.

Figure 2.7. PowerPoint Presentation of Key Alliances



Presentation of Other Results/Conclusions

After presenting the initial findings, the group should then present key overall conclusions, repeating particularly important conclusions demonstrated in the position map and other graphics. This information should focus on what the policymakers and managers need to consider when implementing the policy. These conclusion statements should be concise and clear and may be presented in a list format. (Box 2.5)

Box 2.5. Sample conclusions on the deconcentration of the MOH

All, except one, of the stakeholders in Group 1 (the most important group) act partially or entirely outside of the MOH.

Most stakeholders have little knowledge of the policy and relate it to self-financing and privatization.

Stakeholders identified several potential benefits of implementing the policy:
1) improved quality of service for the user
2) more effective use of collected funds
3) improved personnel training and performance.

Stakeholders identified several possible disadvantages of implementing the policy
1) diminished local level budget
2) implementation of self-financing and privatization
3) diminished power, status, and function of the central level of the MOH
4) transfer of corruption to the local level
5) instability within the labor force.

Many of the stakeholders conditioned their future support on
1) the clarity and continuity of the policies
2) the transparency of the policy implementation process
3) their participation in the process.

Presentation of Recommended Strategies

Finally, the working group presenters should always place the results within the context of recommended actions and next steps so that the sponsor and other policymakers or managers know how to use the results.

To guide these follow-up actions, the working group should develop strategies to achieve the following five basic goals:

- Maintain the support of those stakeholders who are currently supporters
- Increase power and leadership of the supporters
- Convert the opponents to supporters
- Weaken the power and leadership of the opponents
- Convert the neutral stakeholders into active supporters (i.e., convince them to support the policy and increase their power and leadership where necessary).

Two types of strategies can then be identified to meet those goals:

- General strategies: the working group should analyze the interests, concerns, and misunderstandings common to most stakeholders. (Box 2.6)

Box 2.6. Sample general strategies for increasing support for deconcentration of the MOH

Clarify to the stakeholders the vision, objectives, and benefits of deconcentration, as well as its relation to the modernization of the MOH, with the aim of strengthening their knowledge.

Communicate the definitions and consequences of deconcentration, decentralization, self-financing, and privatization.

Inform stakeholders regularly on achieved tangible results from the implementation of deconcentration.

Develop new forms of participation in developing and implementing deconcentration for actors within and external to the MOH.

- Strategies for specific stakeholder groups: the working group should consider the position of each stakeholder, his or her interests (column F of the stakeholder table), and the five basic strategy goals. The working group should develop specific ways of addressing the concerns of the individual stakeholders and securing their *active* support (i.e., increasing their power and leadership so they can demonstrate this support). Figure 2.8 offers an example of how to present this information in PowerPoint®.

Figure 2.8. Sample Presentation of Strategies in PowerPoint

Priority Strategies

POSITION	INTERESTS	STRATEGIES
P/L 1 Supporters **Provincial Directors**	More decision-making power; guidance from central level; attention to local priorities	Increase their leadership by requesting their participation in defining and promoting local level implementation.
P/L 2&3 Neutrals **Medical Associations**	Participation in process; increased salaries	Define specific means for involving them in policy design and implementation. Consistently inform them of progress. Address salary issue if possible, or provide other incentives.
P/L 3 Opponents **Workers' Associations**	Improved working conditions; payment on time; appropriate supplies in facilities; participation in process	Demonstrate how policy addresses working condition issues. Involve local workers' association members in defining policy at the local level to address their issues. Negotiate with upper levels of association.

The working group should present these strategies to the sponsor and other policymakers or managers present, with the following caveats:

- To be most effective, certain strategies may need to remain confidential, known only by a select group of policymakers implementing the policy.
- The strategies should be developed in further detail through concrete *action plans*, *communication plans*, and *negotiation packages*.
- The implementation of the strategies will require the commitment of additional time and resources from the sponsor.
- The implementation of the strategies will require the development of a select group of professionals trained in communication, facilitation and mediation, and negotiation techniques.

It is not always necessary or feasible to implement all of the strategies immediately. In presenting the strategies, the working group should identify a few, select priorities for immediate action (i.e., next steps) by the sponsor or other policymakers or managers. Depending on the results, the working group may recommend implementation of one key strategy for all stakeholders, or implementation of several strategies to address the needs of several stakeholders. In the latter case, the working group should recommend which stakeholders should be targeted for strategy implementation, given the limited resources generally available for implementation. The group can recommend that the following stakeholders be targeted for the first stage of strategy implementation:

- Supporters with little power and leadership: focus on ways of increasing the power and leadership of these stakeholders.
- Neutral stakeholders with medium to high power and leadership: focus on convincing the stakeholders to support the policy and increasing their power and leadership where necessary.
- Opponents with high power and leadership: focus on negotiating for the opponents' support and decreasing their power and leadership if they remain opposed.

Figure 2.9 illustrates a visual prioritization of stakeholders to be targeted for the initial strategy implementation.

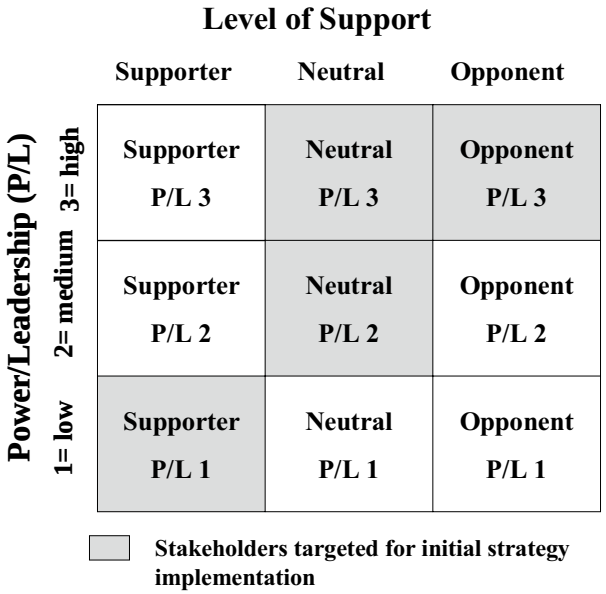
Once the stakeholder groups are prioritized, the working group should present the stakeholders' interests and the specific strategies for addressing their needs. This can be done either in a list or in a table, created in a wordprocessing application or in a PowerPoint® figure, highlighting the power and leadership index of the priority stakeholder with the colored boxes (e.g., as in Figure 2.9).

Following the presentation, the working group should be available to answer questions regarding the process, results, and recommended strategies. If possible, the members of the group should be involved in further developing the strategies into action plans. If that is not possible, the working group should follow up with the sponsor and the other policymakers and

managers who attended the presentation to check on the status of the implementation of the strategies.

Policymakers and managers can use the guidelines and tools found in the subsequent sections of this toolkit to develop and implement the strategies identified here related to communication, advocacy, and conflict management and negotiation.

Figure 2.9. Matrix for Identifying Stakeholders To Be Targeted by Strategies



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Annex 2-A

Sample General List of Stakeholders

The following table illustrates general information on priority stakeholders to be interviewed, with a justification for each group's inclusion in the analysis.

Sector	Sub-Sector	Internal/ External to the MOH	# to be inter-viewed	Reason chosen/relation to policy
International Agencies/ Donors	USAID PAHO World Bank IDB	External	4	External support, in both economic and political terms, has been very influential in determining the direction of health reform efforts.
National Political	Provincial Congressional Representatives	External	3	The provincial representatives have significant impact on implementation of health reform efforts in the regions and represent the provinces' views to the Congress; those to be interviewed are involved in the issues related to this topic.
	Provincial Governors	External	2	The provincial governors are responsible for implementing the executive plans and are the coordinators of public institutions at the provincial level.
Public Entities: MOH	Central level (executive, planning, finances, human resources, operations)	Internal	8	The central level of the MOH will be responsible for planning and implementing the policy being analyzed. They also will be affected by this process, mainly in terms of the redistribution of power from the central level to the provincial and local levels, and will be held to the new results budgeting.
	Provincial and local levels (directors of provinces, areas and hospitals)	Internal	12	Since the process being analyzed includes deconcentration, the provincial and local levels of the MOH will be responsible for implementing many of these changes. In addition, they will be held to new standards for receiving budget, personnel, and supplies from the central level.
Public Entities: other than MOH	Ministry of Finance	External	1	Since the policy deals with resource allocation, and the Ministry of Finance currently controls this allocation, support from these officials for the new policy is required to implement the change.
	Modernization Committee	External	1	The modernization committee has chosen the MOH as its pilot institution to begin public sector modernization efforts; this entity is very involved in planning the specific modernization efforts.
Labor Sector	Medical Associations Nurses' Associations Hospital Workers' Associations National Labor Unions	Internal and External	10	The labor sector in the country is very powerful, and through their protests, labor groups are able to stop political efforts they consider threatening to their interests. In the health sector alone there are numerous organized labor groups, both inside and outside the MOH, from doctor and nurse associations to hospital and MOH labor unions. These groups may be able to stop implementation if they do not support the policy.

Annex 2-B

Definitions of Stakeholder Characteristics and Instructions for Filling in Stakeholder Table

A. I.D. Number

The distinct number given to each stakeholder on the questionnaire.

B. Position and Organization

The position the stakeholder has and the organization for which he or she works.

C. Internal/External

Internal (I) stakeholders work within the organization that is promoting or implementing the policy; all other stakeholders are considered external (E).

D. Knowledge of Policy

This column is divided into two parts. The first part, D1, is the level of accurate knowledge the stakeholder has regarding the policy under analysis. This knowledge should be rated from 3 to 1: 3 = a lot; 2 = some; 1 = none. Final rankings should be reviewed to ensure consistent scoring among all of the stakeholders.

The second part of the column, D2, is to record how each stakeholder defines the policy in question. The information gathered in question #3 of the questionnaire should be noted here in the stakeholder's own words.

E. Position: Supports/Opposes/Neutral

Position refers to the stakeholder's status as a supporter or opponent of the policy. The position of the stakeholder can be obtained by gathering information directly from the stakeholder (i.e., self-reporting) and through information gathered indirectly from other stakeholders or secondary information (i.e., others' perceptions). Thus, the reporting in this column represents the self-reported classification (column E1), the classification by others (column E2), and a final classification considering both (column E3). The position of the stakeholder should be reported from this final classification (column E3).

Stakeholders who agree with the implementation of the policy are considered supporters (S); those who disagree with the policy are considered opponents (O); and those who do not have a

clear opinion, or whose opinion could not be discerned, are considered neutral (N). Those who express some, but not total, agreement with the policy should be classified as moderate supporters (MS). Finally those who express some, but not total, opposition to the policy should be classified as moderate opponents (MO). Thus, in column E1, the position of the stakeholder as they state it in the interview should be entered (S, MS, N, MO, or O).

In column E2, the position of the stakeholder as perceived by other stakeholders and/or from secondary information should be entered with a reference to the ID number of the person who stated that opinion. For example, S 32 would mean that stakeholder number 32 stated in his or her interview that the stakeholder under analysis would support the policy. In column E2, the position of the stakeholder as others perceive it should be entered (S, MS, N, MO, or O) with the ID number for each opinion.

Lastly, in column E3, the final determination for the position of the stakeholder should be entered (after entering data from all interviews). This position should take into account the self-reported position as well as other stakeholders' opinions. S, MS, N, MO, and O can be entered in this column.

F. Interest

The interest the stakeholder has in the policy, or the advantages and disadvantages that implementation of the policy may bring to the stakeholder or his or her organization. Advantages and disadvantages mentioned by each of the stakeholders should be entered into this column in as much detail as possible, since the information will be used primarily in developing conclusions and strategies for dealing with the stakeholders' concerns.

G. Alliances

"A union or relationship" (Webster, 1984). Alliances are formed when two or more organizations collaborate to meet the same objective, in this case to support or oppose the policy in question. Any organizations that are mentioned by the stakeholder in the questions related to this item should be entered in this column.

H. Resources

"A source of support or aid" (Webster, 1984). Resources can be of many types — human, financial, technological, political, and other. The analysts should consider the stakeholder's access to all of these resources.

The resource category is divided into two parts: the quantity of resources that a stakeholder has within his or her organization or area, and the ability to mobilize those resources. The quantity of resources should be classified by the analysts as 3 = many, 2 = some, 1 = few and inserted into column H1 of the stakeholder table. Final rankings should be reviewed to ensure consistent scoring among all stakeholders.

The ability of the stakeholder to mobilize resources should be quantified in terms of:

3 = the stakeholder can make decisions regarding the use of the resources in his or her organization or area

2 = the stakeholder is one of several persons that makes decisions regarding the use of resources

1 = the stakeholder cannot make decisions regarding the use of the resources.

This score should be inserted into column H2. For example, if the stakeholder has personnel that work for him or her, it can be concluded that the stakeholder has the ability to mobilize these resources because he or she has direct influence over them.

I. Power

"The capacity or ability to accomplish something; strength, force or might" (Webster, 1984). Here, power refers to the ability of the stakeholder to affect the implementation of the health reform policy due to the strength or force he or she possesses.

Since "power" is defined here as the combined measure of the amount of resources a stakeholder has and his or her capacity to mobilize them, the two resource scores implied should be averaged, resulting in a power index between 3 and 1: 3 = high power, 2 = medium power, and 1 = little power. The final rankings should be reviewed to ensure consistent scoring among all stakeholders.

J. Leadership

"To direct the activity; to start, begin; front, foremost" (Webster, 1984). Leadership is specifically defined here as the willingness to initiate, convoke, or lead an action for or against the health reform policy. The stakeholder either has this characteristic ("yes") or lacks it ("no"). This is represented with "yes" or "no."

Annex 2-C

Sample Stakeholder Table

(On reverse side of this sheet.)

B	C	D		E				F	G	H		I	J
Position	Intern/	Knowledge		Position				Interests	Alliances	Resources		Power	Leader
& ganization	Extern I E	1 Level 3,2,1	2 Definition	1 Self S, MS, N, MO, O	2 Others S, MS, N, MO, O	I.D. #	3 Final S, MS, N, MO, O	Advant./ disadvant.	Organizations mentioned	1 Quantity 3,2,1	2 Ability to mobilize 3, 2, 1	Resources average 3, 2, 1	Yes No

Annex 2-D

Sample Stakeholder Interview Questionnaire

Date: ____/____/_____ ID #: _____
City: _____

Introduction:

We are from *(organization name)* and we are conducting a study on behalf of *(sponsor name if appropriate)* to explore the opinions of several important actors who are interested in the improved management of the Ministry of Health. As an important actor in the health sector, it is crucial for us to obtain your opinion and that of your organization.

We plan to conduct about 35 to 40 interviews to produce a general report on the opinions of the major health sector actors. The information obtained through these interviews will be for the direct use of the consultants on the analysis team, and will be presented in a general report to *(insert organization for whom report is done if appropriate)* without identifying individual opinions.

We would now like to ask you a few specific questions about your opinion regarding the implementation of deconcentration of the MOH.

Your Opinion:

1. Have you heard of the Ministry of Health policy on "deconcentration"?
2. If so, how did you hear of it?
3. What do you understand "deconcentration of the MOH" to mean?

The Ministry of Health has defined "deconcentration" as "permanently delegating control over resources to the Provincial Directors, Hospital Directors and Area Chiefs." The decisions that these levels would have control over include 1) naming and managing personnel, 2) buying equipment and supplies, and 3) using any funds earned at each facility.

4. What are the potential benefits to you and your organization of the deconcentration of the MOH as the Ministry has defined it?
5. What are the potential disadvantages to you and your organization of the deconcentration of the MOH as the Ministry has defined it?

6. Which of these categories best describes your opinion on the deconcentration of the MOH as the Ministry has defined it? (*Read the options and circle the answer given.*)

a) I strongly support it
b) I somewhat support it
c) I do not support nor oppose it
d) I somewhat oppose it
e) I strongly oppose it

If stakeholder answers a, b, or c, continue below. If stakeholder answers d or e, pass to question #10.

For those who answer "a,""b," or "c" to question #6:

7. Which of the three aspects of deconcentration do you support?

a) Deconcentrated control over naming and managing personnel
b) Deconcentrated control over buying equipment and supplies
c) Deconcentrated control over the use of funds generated at each facility

8. For those aspects of deconcentration that you do support,

a) In what manner would you demonstrate this support?
b) Would you take the initiative in supporting deconcentration, or would you wait for others to do so?
c) Do you have financial or human resources available to support this policy?
d) Which resources are available and how quickly can they be mobilized?
e) Would this support be public?
f) What conditions would have to exist for you to express this support?
g) Would you ally with any other persons or organizations in these actions? Which persons/organizations?

9. Under what conditions would you choose NOT to support deconcentration?

For those who answered "d" or "e" to question #6:

10. Which of the following aspects of deconcentration do you oppose:

a) Deconcentrated control over naming and managing personnel
b) Deconcentrated control over buying equipment and supplies
c) Deconcentrated control over the use of funds generated at each facility

11. For those aspects that you oppose:

a) In what manner would you demonstrate this opposition?
b) Would you take the initiative in opposing deconcentration, or would you wait for others to do so?
c) Do you have financial or human resources available to support this policy?
d) Which resources are available and how quickly can they be mobilized?

e) Would this opposition be public?
f) What conditions would have to exist for you to express this opposition?
g) Would you ally with any other persons or organizations in these actions? Which persons/organizations?

12. Under what conditions would you come to support deconcentration?

We would now like to ask you a few specific questions about your opinion regarding others' opinions of the implementation of deconcentration of the MOH.

Other Supporters:

13. What other organizations, departments within an organization, or persons do you think would support deconcentrating the MOH? (*Probe for MOH and non-MOH stakeholders*)
14. What do you think these supporters would gain from the deconcentration of the MOH?
15. Which of these supporters would take the initiative to actively support deconcentration?

Other Opposors:

16. What other organizations, departments within an organization, or persons do you think would oppose deconcentrating the MOH? (*Probe for MOH and non-MOH stakeholders*)
17. What do you think these opponents would gain from preventing the deconcentration of the MOH?

Annex 2-E

Sample Information Transfer Reference Chart

C	D		E				F	G	H		I	J
Intern/	Knowledge		Position				Interests	Alliances	Resources		Power	Leader
Extern I E	1 Level 1, 2, 3	2. Definition	1. Self S, MS, N, MO, O	2. Others S, MS, N, MO, O	i.D. #	3. Final S, MS, N, MO, O	Advant./ Distadvant.	Organizations mentioned	1. Quantity 3, 2 , 1	2. Ability to mobilize: 3, 2, 1	Resouces average 3, 2, 1	Yes No
According to their position	#1 #2 #3	#3	#6 #7 #8 #9 or or #6 #10 #11 #12	#13 #14 #15 #16		Analysis of self and others info. review interests info. for strength of position	#4 #5 #7 #9 or or #4 #5 #10 #12	#8c #8e #8g or #11c #11e #11g	#8a #8f or #11a #11f	#8a #8b #8c #8d or #11a #11b #11c #11d	Combined score of quantity and ability to mobilize	#8a #8b #8c #8e or #11a #11b #11c #11e

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Forests, discourses, institutions
A discursive-institutional analysis of global forest governance

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ABSTRACT

The leading question of this *Forest Policy and Economics* special issue is whether, how and to what extent forest governance processes can be better understood by means of discourse analysis and the science-policy interface. This article focuses on discourses only, but it does so from an institutional perspective. The reasons to advocate this so-called *discursive-institutional* approach are threefold: (1) to acknowledge the relevance of both meanings and rules in policy continuity and change; (2) to emphasize the role of ideas, concepts and narratives in institutional dynamics; and (3) to make a useful distinction between discourses and practices ('analytical dualism'). As an example of applying this approach, we analyze the case of global forest politics from the early 1980s till today. It shows that new ideas and meanings concerning sustainability, biodiversity and governance have been institutionalized in this field over time, implying policy change and innovation. Compared to more 'classical' analyses, for example based on rationalistic or (purely) institutional accounts, the discursive-institutional approach draws another picture of global forest policy.

1. Introduction

Forest politics can be analyzed in many ways, given the wide array of political theories and policy models 'out there' (Marsh and Stoker, 2002; Sabatier, 1999). Recently, discourse theory has become popular (Fischer, 2003a,b; Hajer and Versteeg 2005; Van den Brink and Metze, 2006). This trend is related to the so-called 'argumentative turn' in the social and political sciences (Fischer, 2003a,b). Whereas rational choice and institutional approaches have been very dominant in these disciplines, their materialist, (post)positivist, interest-based and resource-oriented foundations have been criticized by many. As an alternative, discourse theory has emerged, also in the sub-discipline of forest policy analysis (Elands and Wiersum, 2001; Bengston et al., 2005; Selby et al., 2007). Generally, a (more) ideational, constructivist or interpretive perspective both on scientific research as well as on social practices are posited as starting points (Fischer, 2003b: 209–211). The basic assumption is that history and humans are not so much 'driven' by objective interests, rational calculations, social norms or overt power struggles, but by knowledge production and (collective) interpretations of the world.

Of course, there is not *one* discourse approach. Below we will distinguish four: discourses as communication, as texts, as frames and as social practices. On the basis of the latter two, we propose our own discursive-institutional approach, building on the work of others (Schmidt, 2005, 2008). This type of discourse analysis brings together insights from neo-institutionalism and discourse theory. The basic assumption is that institutional dynamics originate from the emergence of new ideas, concepts and narratives in society that institutionalize in social practices and that affect social outcomes. Vice versa, as a second assumption of this approach, ideas, concepts and narratives that become strongly institutionalized in social practices are considered especially relevant to understand how institutions change or remain stable. It is particularly the latter proposition that brought us to embrace this specific type of discourse analysis. Too often, in our view, discourse analysis sticks to the reconstruction of 'free-floating' ideas and meanings in texts or societies (on sustainability, ecological justice, gender, equity, and the like). Interesting, of course, but: 'So what?' For us, it is much more interesting to observe how and to what extent discourses become institutionalized and affect social processes and outcomes.

As already referred to in the above, discourse theory has been introduced in forest policy analysis too. We will contribute to this literature by introducing a forest case below. On the basis of a discursive-institutional approach, we will analyze developments in global forest policy since the early 1980s. The choice for this case has been made on substantive and pragmatic grounds. Pragmatically, this case was an obvious choice because one of the authors had followed this field for years (Arts, 1998, 2006; Arts and Kerwer, 2007), whereas the other experienced forest policy negotiations in the European Parliament in the late 1990s. Substantively, and more important, this case yields interesting empirical material to study

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the claims of discursive-institutionalism. New discourses – including new meanings attached to old concepts – have indeed emerged in this field the last three decades (biodiversity, sustainable forest management, private governance) and the question is whether and how these have changed policy and management practices. 'Traditional' accounts of global forest policy – from rationalistic, institutional and critical perspectives – generally claim that these effects have been minimal or even absent (Chaytor, 2001; Dimitrov, 2005; Humphreys, 2006). Because large-scale deforestation has continued over the last decades, while only weak global institutions on the forest issue have been built in that same period, such as the *United Nations Forum on Forests* (UNFF), it is generally argued that global forest politics have been rather ineffective. On the other hand, 'traditional' discourse analysis would too easily point at 'policy change' and assume 'policy effects', because new concepts and meaning are indeed floating around in global forest politics. Below we will see, though, that a discursive-institutional analysis renders a more nuanced conclusion.

The format and methodology of this article are as follows. First we will go into discourse theory *sec* and distinguish four perspectives. Subsequently, we will delineate our own, preferred approach to analyze the interaction of discourses and institutions and explain its nature. Then we will introduce the *policy arrangement approach* (Arts and Leroy, 2006; Van Tatenhove et al., 2000), which can be considered a discursive-institutional approach at the level of policy analysis. It enables us to analyze a concrete policy field for which the overall discursive-institutional approach is still too abstract. Methodologically, our analysis of the global forest policy case will be guided by the four interrelated factors a policy arrangement theoretically consists of: discourses, coalitions, rules and power. These variables guided us in analyzing relevant policy documents, academic literature, other texts and conversations with key informants. Starting with a discourse analysis, it will be subsequently assessed below whether and how discursive change in the global forest policy arrangement – if present – was accompanied by coalition (re)formation, changing power relations and new rules of the game over time (compare: Wiering and Arts, 2006). We consider these analytical steps as a specific form of the methodology of 'analytical dualism' (Archer, 1996) and essential tools to move from the rather abstract institutional-discursive approach towards a workable method. Finally, we will wrap up all theoretical and empirical claims in a final conclusion.

2. Discourse analysis

The great many versions of discourse theory and analysis being advocated and applied nowadays have in common the aim to understand the social world by means of ideational and symbolic systems and orders. Discourse theory originated in semiotics and linguistics, but was gradually adopted and transformed in many of the human and social disciplines (Howarth, 2000). Discourse theorists reject both the rational 'homo economicus' and the norm-driven 'homo sociologicus' to explain human action, social practices and societal change (Reckwitz, 2002). In contrast, they posit the knowledge-driven and meaning-searching 'homo interpreter' as their starting-point. So it is neither rational calculations nor social norms that drive human behaviour and choice, but (collective) ideas, interpretations and meanings attached to (parts of) the world. Discourses are perceived as both the *outcome* and *medium* of human action (Hajer, 1995). By giving meaning to the world, human agencies construct discourses. But 'existing' discourses mediate this meaning-given process at the same time. With this position, both the agency and structural character of discourses are generally emphasized in the discourse theoretical literature.

However, these general observations about the main commonalities of the various versions of discourse analysis hide their differences. To generate an overview, we will distinguish four types of discourse approaches below. Each of these approaches interprets discourse in a different way. Our overview of approaches is not exhaustive, but does in our opinion contain the most important ones. Of course, combinations are also possible and widespread, including our own approach below, so that the variability of perspectives being used in academia is far greater than the four presented here. These are: (1) Discourse as 'communication'; (2) Discourse as 'text'; (3) Discourse as 'frame'; and (4) Discourse as 'social practice'. This categorization is a combination and – to some extent – an extension of other overviews in the literature (Howarth, 2000; Fischer, 2003a,b; Reckwitz, 2002; Van den Brink and Metze, 2006; Hajer and Versteeg, 2005).

2.1. Discourse as communication

In daily language, discourse is often associated with discussion, debate or exchange of views with regard to a certain societal or political topic. Particularly in France, every debate is phrased 'a discourse'. In its broadest sense, discourse then refers to *communication*. Now turning from daily language to academia, Jürgen Habermas is among the most well-known social scientists who considers the concept of discourse from a communicative perspective (Habermas, 1996a,b, 2006). But not *any* type of communication is a discourse to him. For Habermas, it is strongly related to his conception of 'deliberative democracy'. This concerns a procedural-pragmatist model of democracy, built neither on liberal interest representation nor on a republican political moral, but on civil society involvement in 'power-free' deliberations, in which 'the best argument' determines the outcome. Such public discourses and the communicative power involved in them should – as a next step – be the rational as well as legitimate basis for the legal discourses, law systems and administrative powers that subsequently govern society. Of course, Habermas very well knows that his model of democracy and the nature and role of discourse implied in it refers to an ideal-type situation (a position for which he has been criticized very often). But it is nonetheless something which a society can – or even *should* – strive for. With that, Habermas also developed a *normative* discourse theory, on top of a *proceduralist* view on democracy and deliberative politics. Considering global forest policy from this perspective would imply an analysis of how decisions are made – one might for example think of the lately accepted *Non-Legally Binding Instrument on All Types of Forests* (2007) – and to what extent the criteria of deliberative democracy (open public discourse, communicative power preceding administrative power, role of civil society, etc.) were fulfilled or not during its realization.

2.2. Discourse as text

In this, most 'classical' version of discourse analysis, texts, language or conversation is the basic unit of analysis. On a scale from 'narrow' – for instance a particular text – to 'broad' – the entire social system –, the linguistic version of discourse is located at the 'narrow' end of the scale (Howarth, 2000). It confines the study of discourses mainly to what is said or written (Potter and Wetherell, 1987). Thus, linguistic discourse analysis may involve a meticulous study of, for instance, a governmental document on forest policy or the debate at a conference on the matter. However, it seldom does so entirely in isolation of context. It is assumed that context influences how a certain text is written and interpreted. The main question is what words are used and what meanings or ideologies are implied in those words, in a particular situation, by particular actors. Critical Discourse Analysis (CDA), next, or Critical Linguistics, also puts texts at centre stage (Chiapello and Fairclough, 2002). It mainly looks at language-*in*-*use* and words-*in*-*context*. Different from linguistic discourse analysis, it aims to explicitly draw attention to conflicts, struggles or inequalities that may result from the use of certain words and texts (Van Dijk, 2001).

2.3. Discourse as frame

The difference between 'discourse as frame' and the previous approach is aptly described by Van der Arend (2007). She emphasizes that 'discourse' in the field of policy and planning is on the one hand used in a similar way as in the previous version, namely as the various meanings of words and texts. On the other hand, discourse is also defined as a shared frame of meaning in this field. Now the use of language in specific situations is no longer the focus of attention, but the ways in which a certain frame of reference or 'frame of meaning' mediate the use of language (Van der Arend, 2007: 27, 28). Here, discourse is more abstract than in the linguistic version. It exists in the minds of people and in the social networks of which they are part. It is based on their experiences and history, of which they may be aware or unaware, but which in either circumstance influences how they speak and act. Well-known is Schön and Rein's work on 'frame reflection' (1994). They argue that policy controversies can only be resolved if the conflicting frames, which the competing parties hold, become a topic of dialogue. It means that frames by which humans give meaning to a certain problem situation need to be identified. This is not an easy task, as these frames are considered to be 'underlying', so not directly visible at face value. Uncovering different frames behind a problem may, according to Rein and Schön, give rise to *re-framing*, which is necessary to come to joint solutions. For instance, by defining a problem such as worldwide deforestation in a certain manner, while building on existing frames, certain types of action seem more self-evident than others. When it is framed as a problem that is (mainly) globally or locally caused, very different policy options will emerge. Again, this also means that problems may also be re-framed in order to legitimize a certain action, or to get out of an impasse of conflicting frames (Snow and Benford, 1988). In global forest policy, the introduction of the idea of forests as 'sinks' for carbon dioxide, in the battle against global warming, has become an extra chapter in the storyline about the need to combat deforestation, stimulate reforestation and conserve nature.

2.4. Discourse as social practice

In contrast to 'discourse as text', 'discourse as social practice' is located at the 'broad' end of the discourse analysis spectrum. This approach is often associated with the work of Michel Foucault (1984). For him, there is a strong relationship between discourse and power, but not just in the sense that individuals exert power *by means of* text or interactions. Rather, power is in the discourse itself (Foucault, 1994; Hook, 2001). It 'disciplines' human agencies to think, speak and act in a certain way and not in others. As Fischer (2003a:38) describes: "Especially important for social science is Foucault's *constitutive* view of discourse, which understands discourse to actively construct society along various dimensions – including the objects of knowledge, social subjects, forms of self, social relationships, and perceptual frameworks." The difference with the former 'discourse as frame' is not as stringent as our overview may suggest, because Rein's theory of policy frames is considered one of the earliest 'practice-oriented' Foucauldian approaches (Wagenaar and Cook, 2003). Nevertheless we perceive a difference between the former and the present approach in that the latter places more articulate emphasis on how discourses, and social practices, including institutional arrangements and power processes, are intertwined. Hajer (1995), whose definition of discourse is often quoted, also emphasizes the relation between discourse and practice. Investigating global forest policy from a Foucauldian angle means identifying the hegemonic discourses that structure this domain, e.g. sustainable forest management, and critically analyze: (1) how this discourse has historically come into being, through what 'epistemes' and 'epistemic communities'; (2) how it 'disciplines' the thinking, speaking and acting in the forest sector; (3) how it 'normalizes' certain behaviour, for example of forest rangers, and excludes others; and (4) how it furthers certain interests (rich countries? industry?) over others (poor countries? environmental movement?).

3. Discourses and institutions

The first two presented approaches – discourse as communication and text – will be less central in our analysis below. Surely, a detailed analysis of texts and speeches which were produced in the context of global forest policy will render insights on focus and orientation of such policy. However, it does in our view not sufficiently link speech and texts to institutional practices which are (potentially) an expression of discursive power too. If there was, for instance, an observable change of the terminology used, this does not automatically imply that institutions – or 'the rules of the game', as these are often defined, being for example norms, conventions, procedures, laws, etc. (Marsh and Stoker, 2002; Schmidt, 2005, 2008) – were also altered. By focusing on speech and text only, the latter insight will probably not be gained. The first, Habermasian approach may be fruitful as well, because it delivers *normative* and *procedural* standards against which the 'deliberative democracy' character of global forest policy can be assessed, but the approach does in our view not render sufficient *analytical* insights into the mechanisms behind policy change or stability. And it is the latter we are interested in.

The third and fourth approach – discourse as frame and practice – both render interesting insights for our analysis below. An example is Hajer's position on discourses and institutions (1995: 264):

> "Discourse analysis is (…) not to be counterposed with institutional analysis, but is rather a different way of looking at institutions that is meant to shed new light on the functioning of those institutions, how power is structured in institutional arrangements, and how political change in such arrangements comes about. The main theoretical thesis (…) is that one can observe how the institutional practices (…) work according to identifiable policy discourses that through their story-lines provide the signpost for action within these institutional practices."

Yet the question remains how discourses and institutions conceptually relate. The ongoing debate is on how far the former concept should be stretched. Frame theorists like Fischer, Schön and Rein, Snow and Benford and Dryzek generally make an explicit *distinction* between discourse and language on the one hand and social action, institutions and practice on the other (Van den Brink and Metze, 2006). There is a physical and social world out there which we give meaning to through framing processes. In contrast, discourse analysts such as Hajer, Howarth and Laclau and Mouffe, who stand in the Foucauldian tradition, define discourse in a *broad* manner, *including* social practices, power and institutions. For them, discourse and language cannot be isolated from action and practice, *because the former in fact constitutes the latter*. Philosophically, these views relate to different perspectives (Crotty, 1998). Critical realists assume a 'real world out there', to which we give meaning through language and culture (Archer, 1996; Clegg, 1989). Hence, a distinction between discourse and practice can be made. Social constructivists, on the other hand, assume that world, language and meaning collide. There is no 'objective world' out there that exists independently of our man-made ideational and symbolic orders. Hence, practice cannot be separated from discourse.

Although we sympathize with the 'discourse as practice' position in a philosophical sense, since we cannot jump over our 'shadow of meaning' into the so-called 'real world', we nonetheless have some problems with it methodologically. This has inspired us to look for a concept of discourse which offers a way out of this analytical issue. We assume that this 'solution' is situated somewhere between 'discourse

as frame' and 'discourse as practice'. The problem we face is similar to what has extensively been debated in the literature on the agency-structure interface. The sociologist Anthony Giddens (1984) claims that too many attempts to explain social change focused either on the behavior of actors or on the potential and limitations that structures (such as rules and resources) provide or impose. He asserts that these possibilities or impossibilities come about through an interaction between the two and that there exists a 'duality of structure'. Neither the actors nor the structures are omnipotent, a starting point on which Giddens builds his 'structuration theory'. There has been a lot of debate as to the feasibility of researching the interaction between actor and structure in a methodological sense. If they influence each other so much, how can we distinguish between them? And what about the time dimension if actor (*short duree*) and structure (*long duree*) cannot be differentiated? To deal with this, Margaret Archer (1996) proposes to apply an 'analytical dualism', treating actor and structure as distinguishable, in order to be able to analyze the relationship in the first place.

Now we are analyzing another, but equally important duality, that between discourse and practice. The question is: how do we acknowledge in our research methodology that discourse and practice are a duality, while at the same time not 'collapsing' them into entities which are hard to separate? The latter would seriously complicate investigation of relations between discourses and (dimensions of) practice (including institutions). For example, how to assess the institutional effects of discursive shifts in a certain policy domain, when we cannot distinct the two in the first place? In line with Archer's solution for the actor-structure problematique, we also propose to apply an 'analytical dualism' in this field and make an analytical distinction between discourse and practice, i.e. institutions. This brings us closer to the 'discourse as frame' position as discussed in the above, at least from a methodological point of view.

Although we are of the opinion that frames are an interesting starting point, we also think that the institutional dimension is at danger to be undervalued if there is no *explicit* focus on it. We need an approach that facilitates analysis of how new ideas, concepts and narrative affect social and political processes and outcomes indeed. In our view, discourse analysts too often stick to the analysis of 'free-floating concepts', although those in the Foucauldian tradition explicitly theorize about the discourse-practice duality, including institutions (see the citation of Hajer, 1995: 264 above). However, their conceptualization of discourse is so broad that a meaningful analytical distinction between the two can hardly be made. In correspondence with Archer's analytical dualism, we turn to another body of literature – institutional theory – and to one of its latest innovations: discursive-institutionalism (Blyth, 2002; Hay, 2006; Philips et al., 2004; Schmidt, 2005, 2008). This approach is a new branch in neo-institutionalism that: (1) tries to overcome the 'orthodoxy' in institutional thinking (like path-dependency and incremental change); (2) wishes to theoretically reflect on abrupt institutional changes and crisis that we observe in the world around us; and (3) emphasizes the role of ideas, concepts and narratives in institutional dynamics. Analytically, the approach makes a clear distinction between discourses on the one hand and institutions on the other, whereby the former (may) affect the latter (see also Buizer, 2008). With that, it definitely exhibits characteristics of 'analytical dualism'.

One of the key concepts in neo-institutionalism – derived from historical institutionalism – is the concept of *path-dependency* (Peters et al., 2005). This concept refers to 'policy legacies', the fact that earlier decisions constrain subsequent policy routes. Or put more general and dramatic: 'history delineates the path we can follow today'. Although this statement seems valid at face value, the solidity of existing institutional arrangements can easily be overstated, while (small) changes and innovations are being overlooked. For that reason, Hay (2006) extends the 'path-metaphor' and adds the concept of path-*shaping* to the one of path-dependency. In addition, Hay asserts – being a 'constructivist institutionalist', as he calls himself – that path-dependency and –formation should be analyzed *both* from an ideational and institutional perspective. According to him, particularly the ideational foundation of institutions is of the utmost importance to understand and explain institutional change. In addition, path-dependency theories cannot account for abrupt changes or institutional crises (Schmidt, 2005). Well-known examples are the unexpected fall of the communist states in Eastern Europe in the late 1980s as well as the 'sudden' break-down of the Keynesian consensus in economics and politics in the same decade, which paved the way for a new consensus, based on (different versions of) monetarism, neo-liberalism, new public management and state reform. Ideas and discourses, both scientific and political in nature, have definitely played roles in these new institutional, path-formation trajectories. The question then remains how this impact of ideas and discourses actually works and how a distinction between relatively insignificant and more enduring effects can be made. With regard to this question, the work of Philips et al. (2004) is interesting. They consider texts – particularly in organizational settings (and in politics, we would like to add) – to be mediates between action and discourse. Individual and group actions are translated into texts, which may – if their effects are enduring – (co)constitute discourses, which in turn enable or constrain actions. These actions again produce new texts, reconstitute discourses, re-institutionalize action, etcetera. Texts are assumed to have (more) enduring effects in case: (a) they cover 'existential' topics, such as organizational sense-making and legitimacy; (b) are written by authoritative authors; (c) take the form of *genres* (i.e. transcend the language of specific organizations); (d) draw upon and contribute to well-established discourses; and (e) enhance the coherency and acceptability of these discourses.

4. Policy arrangement approach (PAA)

In order to make the discursive-institutional approach relevant and applicable in the policy sciences, the *Policy Arrangement Approach* (PAA) was chosen (Arts and Leroy, 2006; Van Tatenhove et al., 2000). Just as the approach above, the PAA tries to find a middle-road between discourse and institutional analysis, applying the principle of 'analytical dualism', but at a 'lower', discipline-specific level of theorizing, namely policy analysis. A policy arrangement can be defined as the way in which a certain policy domain is temporarily shaped in terms of discourses, actors, resources and rules. We will shortly deal with these dimensions one-by-one, although it should be kept in mind that the four dimensions are strongly interwoven.

The PAA defines policy *discourses* as interpretative schemes, ranging from formal policy concepts and texts to popular narratives and story lines, which give meaning to a policy issue and domain (adapted from: Dryzek, 1997; Fischer, 2003a; Giddens, 1984). Overall, it is assumed that policy arrangements 'contain' more than one discourse that differ and may compete. This difference and competition causes actors to group together in coalitions to enhance certain discourses and constrain others. The second dimension of the PAA – *actors* – can therefore be labelled 'discourse coalitions' (Hajer, 1995). The third dimension refers to *rules of the game* that delineate a domain (Kickert et al., 1997). Rules define the way the game should be played and within which boundaries. How should issues be framed, agendas communicated, policies formulated and decisions made? And through which procedures, allocation of resources and division of authority and competencies? The final dimension, *resources*, is intrinsically linked to the concept of power (Giddens, 1984). In general, power has to be regarded as the ability of actors – here: discourse coalitions – to mobilise resources in order to achieve certain outcomes in social systems. It is assumed that discourse coalitions strive for hegemony in policy arrangements in order to realize their preferred policies. At this point, though, we

wish to re-emphasize that the four analytical elements should be analyzed, while *continuously* monitoring their mutual relationships. It is only in this way that they facilitate to understand the discursive-institutional dynamics in policy processes.

It should be noted that a policy arrangement analysis can start with *any* of the four dimensions (Arts and Leroy, 2006). From a discursive-institutional perspective, we advocate the sequence of dimension analysis as proposed in the previous paragraph (compare: Wiering and Arts, 2006). First, a discourse analysis of the policy arrangement should be undertaken, with an obvious interest in discursive change and continuity. In a next step, the relationship between such discursive dynamics and: (1) coalition formation; (2) rules of the game; and (3) power relations; should be assessed. In line with Philips et al. (2004), it can be hypothesized that it is more likely that there will be institutional consequences, when these discourses raise existential topics, can be anchored in 'given' frames as well as exhibit legitimacy, authority and consistency.

So far, four concepts were introduced in this paper to facilitate the analysis of discursive-institutional dynamics in a policy domain. They can be used in empirical studies of everyday policy practices, for instance in relation to forest policy. By using these concepts, change or continuity can be grasped (1) as a result of the interrelatedness of agency and structural factors, and (2) as a result of the interrelatedness of discursive and institutional practices, such as the emergence of a certain concept and the setting of a rule, the allocation of resources or the formation of a coalition. What it does *not* do is relate these dynamics at the level of policy sectors to macro socio-political developments in societies, such as globalization, decentralization and state reform, which definitely affect processes and outcomes within policy domains too. These are referred to as political modernization and are part of the original policy arrangement approach too (Van Tatenhove, 1999; Van Tatenhove et al., 2000). Although relevant for global forest governance for sure, we will not empirically deal with this topic below and restrict our analysis to the *internal* dynamics of the arrangement.

5. Global forest policy

5.1. New discourses

Within the global forest regime, three (relatively) new discourses have emerged since the early 1980s: these concern *biodiversity*, *sustainable development* and *governance* (Humphreys, 1996, 2006; Johnson, 1993; Kolk, 1996; UNGA, 2007)[2]. We will briefly deal with these discourses one-by-one. The concept of biodiversity was first introduced in 1986 at the conference 'The National Forum on BioDiversity', which was held in Washington, DC, USA (Jeffries, 2005; Wilson, 2006). This conference not only dealt with the richness of life on earth and the threat to and extinction of species, but also with the economics, functions, values and conservation of biodiversity. These subjects demonstrate that the concept has never had a purely biological connotation. Another source for the term biodiversity has been the IUCN (Arts, 1998). This international nature conservation organization put the need for a global biodiversity convention on the agenda in 1984 and wrote a draft treaty thereafter. Inspired by this, the United Nations Environment Program (UNEP) established an intergovernmental negotiation committee to design a legally-binding global biodiversity treaty. This led, after complex and difficult negotiations, to the adoption of the Framework Convention on Biological Diversity in 1992, which was signed by most countries at the UNCED in Rio de Janeiro in the same year. Its aim is to conserve biodiversity worldwide, to use it in a sustainable way and to share its benefits equally.

Compared to earlier definitions, the concept of biodiversity is now interpreted in a much broader and more integrated way; it now not only refers to species diversity, but also to the diversity of genes and habitats. From the beginning, much of the discussion surrounding biodiversity focused on tropical rainforests. According to biologists, more than 50% of the terrestrial species on earth are found in this ecosystem, while it only covers about 7% of the Earth's land surface (Wilson, 2006). Given this richness, processes of deforestation and degeneration might account for an annual loss of about 5000 species. Whether these figures are correct or not, forests and biodiversity have always been strongly related issues. Therefore, the 'forest crisis' has, to a large extent, been framed in the language of biodiversity (loss).

Sustainable development, the second concept of the new forestry discourses, became tremendously popular at the end of the 1980s and the beginning of the 1990s. This was largely due to the publication of the Brundtland report *Our Common Future* and the preparation of the UNCED conference in Rio de Janeiro in 1992, although it should be realized that the concept was definitely not new (Johnson, 1993; WCED, 1987). Its origins go back to German forestry of the 19th century (Wiersum, 1999). At that time, the notion of 'sustained yield' was introduced to balance human needs for forest products, on the one hand, and the production capacity of the forests, on the other ('harvest equals biomass growth'). At a later stage, the concept of sustainable yield was broadened. Ecological and social dimensions were added. The concept of 'sustainable development' first appeared in the 1980 *World Conservation Strategy* (WCS) of IUCN, UNEP and WWF (Arts, 1994). However, its meaning was mainly conservation-oriented in the WCS, whereas the Brundtland Commission defined sustainable development as a way to integrate economy *and* ecology. 'Producing more with less' is one of the key messages in the report. Through rapid development and immediate and worldwide application of environmental technology, economic growth, environmental performance and the conservation of natural resources should go hand in hand, benefiting both present and future generations. This belief in 'win-win-options' is one of the core assumptions of the (mainstream) sustainable development discourse. It is therefore no surprise that it was warmly welcomed by governments, business and the environmental movements alike. It was also well received in the forest sector, because it mobilized stakeholders who had often previously been opponents: loggers, wood processors, timber traders, nature conservationist, rich consumer countries, poor producing countries, etc. The basic idea of sustainable development has been to integrate the use of resources *and* the conservation of biodiversity in new approaches of 'sustainable forest management' (SFM). Of course, this concept has been controversial and has hardly or only partly been implemented so far, but it has also been firmly institutionalized in our minds, organizations and policies. We can no longer simply do away with it.

A third relevant discourse to understand the development of the global forest regime is the one of 'governance'. To most, governance refers to a paradigm shift in the way current societies and organizations are governed (Pierre, 2000). Due to processes such as increasing state failure, market liberalization, internationalization, decentralization and individualization, the old paradigm of top-down, state-led, 'command and control' ways of steering no longer suffice. Instead, new forms of multi-actor and multi-level governance and new types of policy instruments have been propagated: network-like arrangements of public and private actors, self-regulation by market organizations, public-private partnerships, emission trading schemes, covenants, certification programs, etc. (Bendell, 2000; Glasbergen et al., 2007; Kickert et al., 1997). Some refer to this as a 'shift from government to governance' or as 'governance without government'. In forestry and forest politics, new governance arrangements have been

[2] It should be noted that it is *not* the literature quoted that identified these three discourses, but we ourselves. Yet our choice is based on reading and interpreting this work.

introduced too (Meidinger, 2002). For example: community forestry, partnerships between NGOs and business, voluntary agreements, and certification programs. However, the concept of 'governance' is just as contested as 'sustainable development'; there are too many meanings floating around, 'the retreat of the state' is too hastily proclaimed and the notion of power (asymmetry) is under-theorized (Pierre, 2000).

5.2. New coalitions

In retrospect, one might claim that the biodiversity discourse split the forest community into two 'discourse coalitions' (Hajer, 1995) in the early 1980s: one proclaiming a global forest crisis, dramatic biodiversity loss and the need for massive conservation efforts (biologists, NGOs, UNEP and many developed countries), and the other focusing on forestry, economics, development, and trade (foresters, industry, UNCTAD and most developing countries). At a later stage, though, the sustainable development discourse 'helped' to (partly) merge these coalitions, since this discourse is built on the idea that economics and ecology can be integrated. More and more, foresters and conservationist agreed on approaches of 'sustainable forest management' (SFM) as means to integrate the use of forest resources, on the one hand, and the conservation of forest biodiversity, on the other. Moreover, the governance discourse produced new tools to give organizational shape to this integration process, partnerships and certification programs being the most prominent. This all came together in the *Forest Stewardship Council* (FSC), being both a partnership of NGOs and business as well as a certification program (Bendell, 2000). As a result, 'old enemies' – environmental movements and (often multinational) firms – started working together. In an earlier publication, we tried to analyze the reasons why these collaborations came about (Arts, 2002). On the one hand, environmental movements became strongly professionalized and realized that industry was not only part of the problem, but also part of the solution. Consequently, 'market environmentalism' was no longer a dirty concept. On the other hand, businesses also realized that fulfilling their social responsibilities was not necessarily a bad proposition. Besides 'profit', 'people' and 'planet' are important assets, too (which is called *Triple*-P). Moreover, social corporate responsibility (SCR) can be good for money-making and reputation-building, given growing consumer awareness.

In terms of coalitions, we now seem to be entering a new phase in global forest politics. Originally, the public sector was rather dominant, but most governmental and intergovernmental initiatives of the 1980s failed, according to many NGOs and experts, including the adoption of a legally-binding, global convention on forests. As a consequence, private partnerships and community initiatives took over in the 1990s to fill the 'governance gap' (Bendell, 2000; Wiersum, 1999). Now, governments are re-entering the scene in a number of ways, playing both traditional and innovative roles (Visseren-Hamakers and Glasbergen, 2006). Firstly, governments have started to play active roles in partnerships and certification programs, for example, PECF (European countries) and MTCC (Malaysia). Secondly, governments have also (partly) reformulated the debate from sustainability to legality in the *Forest Law and Governance* (FLEG) initiatives. And, finally, governments (and other stakeholders) have realized that private governance alone can never achieve sustainability at a larger scale (Glasbergen et al., 2007). They come to the conclusion that governments are simply needed to secure legality and security and to combat corruption and misuse. These activities refer to the more classical functions of the state (Pierre, 2000). As a result, we now see the emergence of mixed coalitions of governments, NGOs and businesses in a (difficult and controversial) search for sustainability and legality in global forestry, wood processing and timber trade alike. Hence, a 'hybridization' of *government* and *governance* is taking place in global forest politics today (Arts and Leroy, 2006).

5.3. New rules of the game

Binding law making, rule design and control of compliance, both at the national and international level, are the classical approaches of governments. As said, these have been challenged and, to some extent, replaced by other types of private rule making and enforcement, also in the forest domain. After all, the emergence of the biodiversity, sustainable development and governance discourses, which were embraced, developed and reinforced by new coalitions of government, private enterprise and civil society, went hand in hand with the enactment of new rules. Governments have introduced *voluntary* rules, and market and civil society have established *private* rules (Meidinger, 2002). For example, states have agreed on the voluntary Target 2000 in the ITTO, on the formulation of non-binding *National Forest Programs* (NFPs) in the UNFF and on the *Non-Legally Binding Instrument on All Types of Forests* (Humphreys, 1996; UNGA, 2007). Enforcement is guarded by communication and deliberation among governments, with NGOs playing the role of watchdog. These communicative types of enforcement have, however, produced mixed results. The ITTO 2000 Target has never been fulfilled, whereas the NFP process seems rather successful. And it remains to be seen whether the non-binding instrument will be effective, since it has been adopted only very recently.

Besides public-voluntary ones, private rules, such as certification programs (Forest Stewardship Council, Sustainable Forestry Initiative and others), have been introduced. Here, independent, private systems of monitoring, verification and accreditation have been set up to build up credibility among producers and consumers (Cashore et al., 2004.). These systems appear relatively successful, at least more successful in terms of enforcing compliance than the voluntary approaches of governments. For example, the forest surface being certified by FSC today amounts to more than 100,000,000 ha. worldwide.[3] Yet, the *scope* of the private rule system remains limited, because it does cover only a minority share of the countries, firms and timber markets around the world. More promising then might be the combination of public and private rules. Expertise and commitment of private actors, on the one hand, and support and facilitation by governments, on the other, could produce the optimal mix for 'smart regulation'.

Rules of the game, however, refer to more than just (formal) law and rule making. It is also about access rules, interaction rules and policy styles (Kickert et al., 1997). Regarding these, a change can be observed in global forest politics over the last 25 years too. Whereas the domain in the early 1980s resembled what Keohane and Nye (2000) calls the 'elite club model of intergovernmental politics', the domain has now been opened. Concepts such as participation, multi-stakeholder dialogue and interactive policy making have been introduced in this area as well. For example, NGOs could play more prominent roles in intergovernmental negotiations in the 1990s than in the 1980s (Arts, 1998). The same goes for other stakeholders, like indigenous peoples. Yet this issue of participation remains delicate. For example, NGOs today feel excluded, for a large part, by governments from the several FLEG processes. Hence, while there seems to be a trend towards more open policy styles, 'real access' has to be fought for and defended repeatedly in each new negotiation round.

5.4. New power relations

Given the interconnectedness of the four dimensions of a policy arrangement, it is safe to assume that the changes in discourses, coalition formation and rule making in global forest politics have also affected power relations. What is the most striking is the emerging

[3] See www.fsc.org.

power of non-state actors vis-à-vis states. To mention just one example, nature conservation organizations like IUCN and WWF are referred to in the above as: (1) having co-framed the biodiversity and sustainability discourses, (2) having influenced the UNEP Convention on Biological Diversity, and (3) having established the Forest Stewardship Council. Consequently, these NGOs exhibit *decisional*, *discursive* and *regulatory* power, as we have argued elsewhere (Arts, 2003). The first type of power refers to political influence: the extent to which NGOs are able to influence political decision-making by states. The second type is defined as the capacity of NGOs to (co)frame political discourses. Finally, the third type refers to the NGO capacity to design private rules themselves, like labelling schemes.

Of course, one should not overstate the power of NGOs vis-à-vis states and business. For example, the latter has also considerably influenced the biodiversity regime (Clapp, 2002) while states remain the most important 'power containers' in international politics (Pierre, 2000). Moreover, NGOs score differently over the various types of power, with decisional power being the least probable. Directly influencing intergovernmental decision-making remains difficult after all (Arts, 1998). More power is probably exercised by NGOs in the discursive and regulatory realms. Since these types of power are as important as the decisional one for regime building (Pattberg, 2006), it can be concluded that global forest politics has, to a large extent, recently been shaped by non-state actors. It remains to be seen, though, whether this power balance will again shift towards states in the near future now that they seem to have regained some new initiatives and roles (e.g. FLEG).

5.5. Another perspective on global forest policy

The above analysis of global forest policy by means of the PAA generates a rather different picture than other accounts of global forest policy, which often emphasize that the latter has (largely) failed (Chaytor, 2001; Dimitrov, 2005; Humphreys, 2006). To underpin their conclusions, these authors often use rationalist and/or institutionalist arguments. The former conceptualize policy making as a rational process to solve or reduce societal problems on the basis of a well-ordered policy process for preparing, formulating, implementing and effectuating policy objectives (Dunn, 1994; Sabatier, 1999). Hence, policy success is defined as 'effectiveness on the ground'. When these effects are lacking, the policy concerned has failed. Institutionalists, on the other hand, claim that (rational) behavior is mediated by norms, conventions, procedures, laws and the like (to be defined as 'institutions') (Marsh and Stoker, 2002; Schmidt, 2005, 2008). As a consequence, institutions that guide people to behave in accordance with the policy goals concerned are considered indicators for policy success. A lack of institution building and/or a lack of strong ('binding') rules therefore refer to policy failure. Now, assessing global forest policy from these two perspectives, one cannot conclude otherwise than that it has failed or largely failed, given: (1) the continuing loss of forest surface worldwide and the increasing threats to biodiversity ('lack of effects on the ground'); and (2) the nature of its institutions, like the UNFF, its NPF process and its non-legally binding instruments on all types of forests (that are 'weak and soft').

However, taking a discursive-institutional perspective, as we did in this paper, offers a more nuanced picture. Of course, many forests around the world are still under threat and disappearing – we will not deny that – but the new vocabulary is more than 'just' words. Sustainability, for example, is now strongly rooted among our ears and has been 'materialized' in many forest-related practices (partnerships, standards, instruments, programs, etc.). Even more so, we believe that the prerequisites of Philips et al. (2004) for strong institutionalization of discursive shifts (existential topics, anchoring in 'given' frames, exhibition of legitimacy, authority and consistency; see above) are fulfilled in our cases study. The topics dealt with are indeed *existential* (deforestation and forest degradation, related to biodiversity loss and climate change), the new discourses could be *anchored* in 'given' frames (particularly the 200-year-old 'sustainability frame' of forestry) and they gained *legitimacy*, *authority* and *consistency* over the years, given the increasing support by international organizations, NGOs, governments and scientists alike. In addition, we are less pessimistic about the potential effectiveness of soft law and non-binding institutions than the above cited authors, since empirical research observed both national and local effects of such international, communicative, law-like arrangements (Brütsch and Lehmkuhl, 2007; Holzinger et al., 2008). Therefore, on the basis of our analysis, we would like to conclude that the term 'failure' does not sufficiently take into account the 'what' and 'how' of global forest governance.

Our conclusion, by the way, is also confirmed by other global forest policy literature out there. For example Pülzl (2005) observes similar discursive shifts in global forest policy (from a 'tropical rainforest' narrative in the 1980s to a 'sustainable forest management' narrative in the 1990s) that have been consequential for the sector as a whole. At least the *framing* of the policy problem and the policy solution have been fundamentally changed. Moreover, in accordance with her Foucauldian approach, Pülzl considers this new narrative as a form of epistemic power that inevitably produces social transformation.

6. Conclusion

The analysis in the above shows that a combination of discourse and institutional analysis renders new insights into global forest policy. Operationalizing the two approaches by means of analytical dualism and, in a next step, by means of the policy arrangement approach, enables us to observe how discursive and institutional dimensions of policy making (discourses, coalitions, rules of the game and power) relate to each other and produce new social practices on forests in the course of time. With that, insights were gained in the ideational and institutional sources of global forest policy change.

In relation to our global forest case, recent years showed, for instance, that the sustainable development, biodiversity and governance discourses 'materialized' in the form of new partnerships, certification programs, voluntary instruments and an empowerment of non-state actors. The case study reveals how the sustainable development discourse opened the door to coalitions, which succeeded in combining economic interests with ecological aims. In terms of rules, this gave rise to a period in which mainly voluntary and private agreements came into being, which were able to apply these integrated objectives, FSC being a conspicuous example. Perhaps this was a necessary step to come to the more recent 'hybrid' formula in which these voluntary arrangements are combined with greater governmental intervention. Seen from this perspective, the global forest policy arrangement has altered significantly on the basis of discursive changes.

Given this analysis, we cannot agree with several global forest policy analysts who claim that this policy has largely failed. Of course, we would not claim that all problems on the ground have been solved or will be solved soon or that current global forest institutions are the strongest in the global governance arena. On the contrary. At the same time, we observe a strong 'materialization' of discursive shifts in institutional practices in forest management, implying policy innovation, management change as well as sustainability effects on the ground. Though not yet *the* overall mainstream at global scale, this feeds hope for the future.

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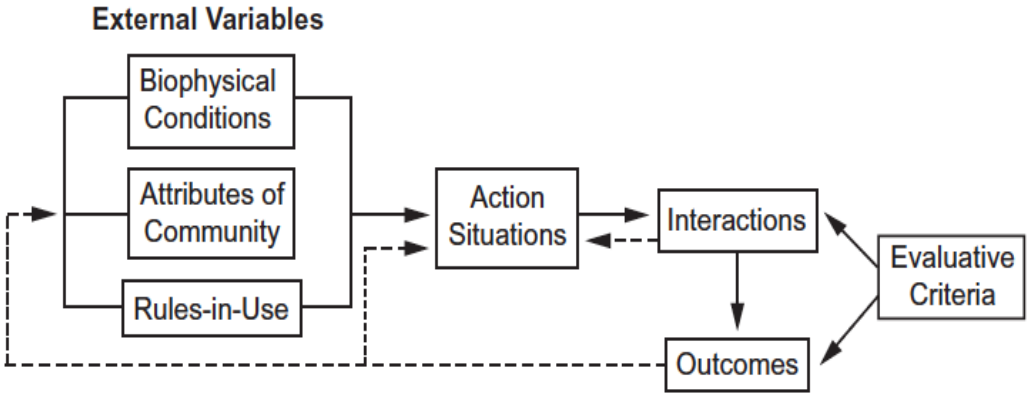
The Institutional Analysis and Development Framework Overview

The Institutional Analysis and Development (IAD) framework was formulated by Elinor Ostrom and colleagues to create a common analytical tool to communicate and compare different theories and models across disciplines. The specific objective of the framework is to integrate studies of how institutions affect the incentives of an individual's decision-making and the subsequent behavioral response. The range of studies that have adopted the IAD framework include: 1) the effects of forest decentralization, 2) comparative study of daycare centers, 3) the impact of rules on common-pool resource setting outcomes, 4) the performance of housing condominiums, 5) the evolution of banking reform and on (E. Ostrom 2005). The framework offers a format for scholars and policymakers in the evaluation of how governance systems may or may not and by what mechanisms facilitate individuals in solving problems democratically (Ostrom 2011). In order to account for variance in outcomes in collaborative institutions, Ostrom and colleagues developed an analytical approach to explain the absence and presence of cooperative behavior (Elinor Ostrom 1994). In addition, Ostrom states, that a review of institutional performance and the component parts that influence outcomes is necessary in the evaluation of policy reform and transition (Elinor Ostrom 2011).

In the IAD framework the *action situation* is the focal point of analysis (see Figure 1). The action situation accounts for a range of factors such as the number of participants involved, the choices available to participants and the incentives faced by participants and the different outcomes that may result from interactions among participants (Elinor Ostrom 1994). An example of an action situation are the collective action problems that arise in irrigation systems in which individuals trying to advance their interests end up producing unintended and harmful consequences for themselves and others (Tang 1992).

Figure 1: The IAD Framework



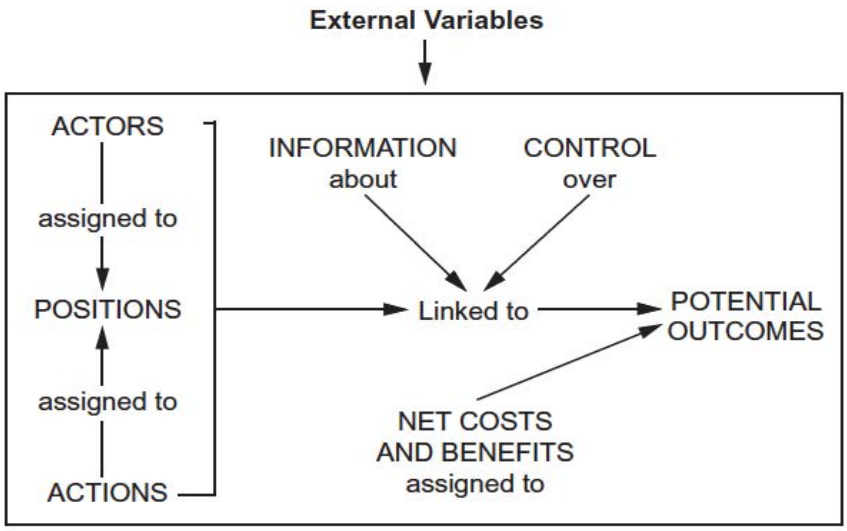
Source: Ostrom 2011

The IAD framework delineates the contextual attributes that shape various action situations. Analysis of the action situation is the examination of rules-in-use in relation to the

physical characteristics and community attributes that produce various outcomes. Identification of the relevant variables within the action situation is the first step of analysis that can be used to describe, analyze, predict and explain behavior within an institutional arrangement. The relevant questions to be considered in an action situation are the following (see Figure 2):

- Who are the actors?
- What are the positions?
- What are the set of allowable actions?
- What are the potential outcomes?
- What is the level of control over choice?
- What kind of information is available?
- What are the benefits and costs of actions and outcomes? (Ostrom 2011)

Figure 2: The internal structure of an action situation

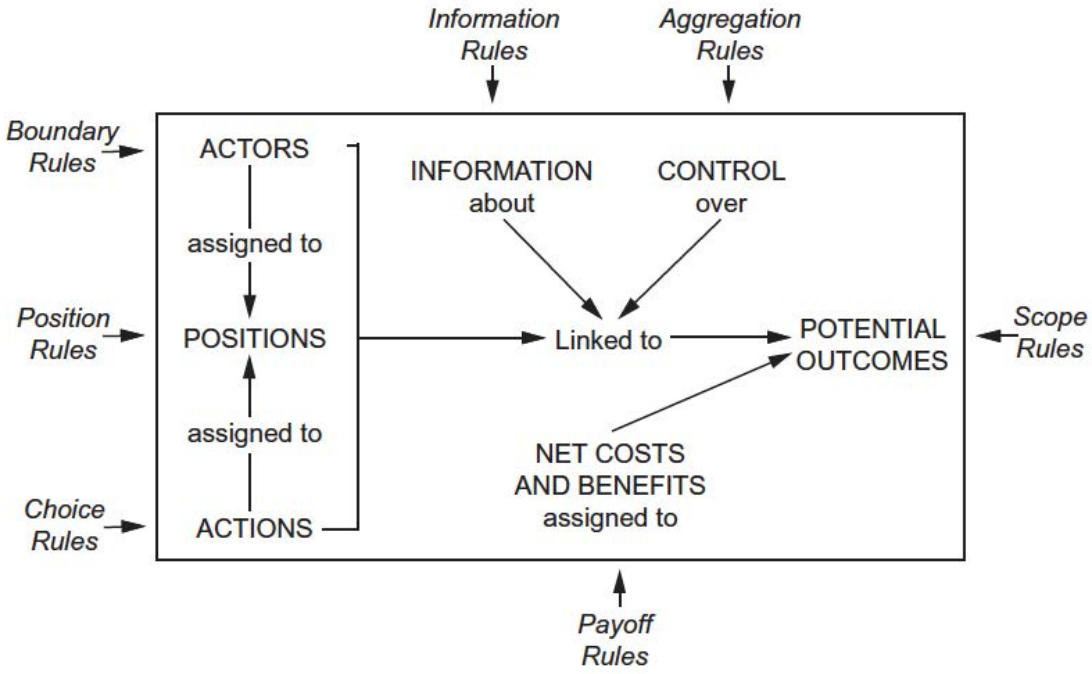


Source: Ostrom 2011

The IAD framework identifies and analyzes the different sets of rules that shape the interactions within the action situation (see Figure 3). The typology of rules that the framework identifies are 1) *boundary rules*: the rules that indicate participants 2) *position rules*: how does an individual gain or lose a position? 3) *scope of rules*: the understanding of the geographic and functional domains of existing rules 4) *choice rules*: the understanding of restrictions on harvesting technologies 5) *aggregation rules*: the understanding of the rules affecting harvesting activities 6) *information rules*: the rules of information flow and confidentiality 7) *payoff rules*: the rules regarding the size of sanctions for violation of rules (Ostrom 2011).

Because of the interdependency of rules, analysis of institutions can be challenging. The IAD framework presents a *multiple levels of analysis* approach or "rules within rules" because of the nested nature of institutions. Multiple levels of analysis take into account three levels of rules that together affect the actions and outcomes in a given setting (Elinor Ostrom 1994). The three levels are *1) operational rules*-which are the day-to-day decisions made by individuals 2) *collective-choice rules* (policies)-that determine eligibility and specific rules to be used in changing operational rules that ultimately influence operational activities 3) *constitutional choice rules*-indicate who is eligible to participate in policy-making and the rules to be used in developing the set of collective choice rules that in turn affect the set of operational rules (Ostrom 1994).

Figure 3: Rules affecting an action situation



Source: Ostrom 2011

Evaluation of the governance system can be done for current outcomes or potential outcomes under an alternate set of conditions. Evaluative criteria can be applied to outcomes as well as the process of achieving outcomes (Ostrom 2011). Evaluative criteria for predicted or explained outcomes typically consider efficiency and pareto optimality. Some of the more common criteria are: *1) economic efficiency*: the net benefits of a resource arrangement, *2) equity through fiscal equivalence*: proportional investment and benefit equity among individuals *3) redistributional equity*: improved benefits for economically disadvantaged, *4) accountability*: authority awareness and effort in balancing efficiency with equity (redistributional) goals, *5) conformance to values of local actors*: outcomes that match community values and objectives and *6) sustainability*: adaptability to unpredictable environmental changes (Ostrom 2011).

Guadalupe Valley and Decentralized Groundwater Governance:
An application of the IAD framework

The analysis of the governance system in Guadalupe Valley, Mexico will focus on the IAD framework's action situation previously described. Although the external variables of the biophysical and community domains are critical in understanding the overall constraints encountered under current management, identifying the rules and unpacking the situational dynamics is an instructive exercise in evaluating the performance of the reformed governance system. Evaluation criteria centers on the *effectiveness* of the new governance regime in garnering participation from the local groundwater users. Participation in this case entails a diverse set of activities that indicate varying degrees of engagement such as: 1) knowledge of the new institution, 2) meeting attendance, 3) office solicitation, 4) volunteer well for monitoring, 5) well registration, 6) meter installation, 7) volunteer as an official, 8) employ water conservation strategies. The following analysis is based on research conducted in 2010 and 2011 during which time 14 semi-structured and 167 structured interviews were carried out with local groundwater users. In addition, interviews were undertaken with COTAS officials, local University specialists and community leaders.

The action situation:
Actors, positions and new rules

Mexico's adoption of a decentralized approach to environmental management created a massive wave of institutional reforms. In 1992 a new water law (Ley de Aguas Nacionales) designated water as federal jurisdiction. A water commission (CNA) was established to regulate and enforce the new water law through permits and sanctions. Water user associations were rapidly implemented nationwide and, in the case of surface water irrigation systems, to self-manage water resources. In areas where groundwater basins are threatened by overdraft, community-based aquifer technical committees (COTAS) were instituted. The motive behind COTAS was to inform the public on groundwater conditions and to provide assistance in mandatory registration and metering of agriculture wells. Registration is through the federal water authority CNA who manages the allocation of rights and enforces violations through the administration of (excessive) fines.

Guadalupe Valley is an agrarian community that is transforming into Mexico's own Napa Valley. Viticulture is the dominant economic activity and not coincidentally utilizes the majority of the water resources. A federal mandated moratorium was placed on new well construction and extraction of groundwater beyond the alIocated amount was prohibited. However, enforcement by CNA of the regulations has not occurred until recently (2011) with fines ranging from $20,000-500,000 (USD). The majority of fines were given to groundwater owners that had not registered their wells or had not filed the necessary documentation required by law to operate a well.

In 1999 COTAS Guadalupe was given title when federal investigators discovered that groundwater pumping was decreasing water levels in the valley. However, it was not until 2004 when a local groundwater user and viticulturalist volunteered as president, that the association functioned as an operating institution. Local volunteers were found to serve in the various functions of the association such as managing the COTAS office and assisting groundwater users in preparing documents, implementing a water level monitoring program and providing

informational meetings. COTAS officials are predominately viticulture producers with a long history in the valley.

Problems with rules:
Aggregation, position and payoff

Through interviews with groundwater users, I discovered that many did not have any knowledge of COTAS. The groundwater users that were aware of COTAS were in the most part viticulturalists that resided in the upper valley (N-NE). These individuals had their groundwater wells registered, monitored and sometimes attended COTAS meetings. There are many possible explanations for the asymmetry in participation in the groundwater institution, which is beyond the scope of this analysis. However, rules regarding position acquisition and the issues that may arise when there is no downward accountability other than to one's economic peers appears to be an important variable to consider. An untrained volunteer of an institution that can favor one group over another may present an obstacle in achieving equitable outcomes.

Individuals that received fines were not adequately informed of the degree and timing of enforcement. The administration of fines came in one fell swoop without warning. In addition, survey respondents and COTAS officials indicated that CNA documents once received had to be replied to within five days. In many cases these time sensitive documents when hand delivered were not given directly to the owner of the well but rather to an employee or any available individual. Rules concerning what wells to register, how and when to register and the consequences are the result of the lack of information outreach by COTAS. Many respondents indicated that they had seen the COTAS office or had heard of them but believed they were an extension of CNA. Considering the sign above the COTAS office has both institution titles, it seems a challenge to convince them it is (in theory if not in practice) a civil society association.

Evaluation: Effectiveness and accountability

In the given synopsis of decentralized groundwater governance, the COTAS institution is shown to be ineffective in building trust and gaining participation in the new rules established in the new water law. The groundwater institution's inability to generate an information flow concerning relevant information about groundwater regulations that moves downward to the community of groundwater users and an upward flow to the federal authority concerning local conditions demonstrates a remiss of downward accountability that is necessary in a functional decentralized regime (Ribot et al. 2006; Agrawal 1999; Andersson 2006). The role of COTAS is compromised by the lack of democratic structure in the positioning of officials, the diminished control of the rules and enforcement, and the unequal representation of the local groundwater users.

Resources

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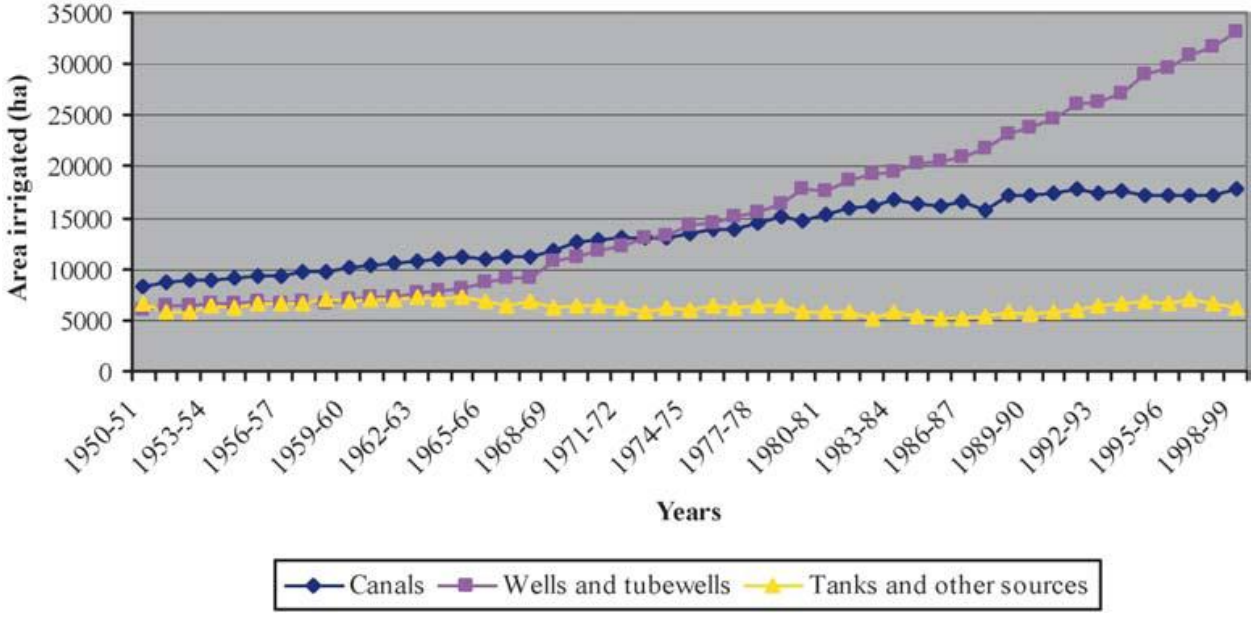
Groundwater Institutions:
The groundwater boom

The overriding benefits of groundwater versus surface water in regards to decreased costs through technological advances and agriculture efficiency gains indicate the prevalence of global groundwater development. Groundwater dependency in comparison to surface water is a result of decreasing energy cost investments and the increasing construction costs of surface water development. Agriculturalists that use groundwater as an irrigation source are significantly more efficient and productive than surface water users. The intensification of agriculture that resulted in increased yields during the 'Green Revolution' is attributed to tubewell expansion and exploitation. A reliable source of irrigation water improves the response of crops to fertilizer inputs and can improve crop productivity by five times (M. R. Llamas & Emilio Custodio 2002; J. Burke 2002; Mukherji & Shah 2005). Garrido and Livingston (2003) argue that the flexibility and reliability of groundwater supplies in combination with decentralized development and management make groundwater an irresistibly lucrative investment. Indeed, the value of groundwater is reflected in 60-70% global dependence for irrigated agriculture production (Kemper 2007).

Since the 1970's, in most parts of the world technological advances, in well drilling and pump technology has spurred the rapid expansion of tubewells (see Figure 1). India and China have some of the highest withdrawal rates and the most populous agrarian economies (see Figure 2). Management of groundwater resources has mostly been in response to changes in groundwater supply and quality. A range of drawdown externalities are the result of intensive and unrestricted use such as: 1) critical changes in pattern of groundwater flow; 2) declines in stream base flows, wetlands, etc. with consequent damages to ecosystems and downstream users; 3) increased pumping costs and energy usage; 4) land subsidence and damage to surface infrastructure; 5) reduction in access to water for drinking, irrigation and other uses, particularly for the poor; 6) increases in the vulnerability of agriculture (and thus food security) and other uses to climate change or natural climatic fluctuation as the economically accessible (buffer) water source (FAO 2003).

Figure 1: Progress in area under different sources of irrigation in India. 1950-51 to 1998-99



(Source: Cited in Mukerji & Shah 2005. Agriculture Census, Government of India)

Figure 2: Groundwater irrigation in selected countries of the world

Country	Total agricultural water withdrawal (km^3)	Percentage of groundwater-irrigated area to total irrigated area	Total groundwater-irrigated area (million ha)
India	581	58	33.12
Pakistan	162	34	4.77
Bangladesh	70	70	2.59
China	415	NA	NA
USA	209	20	NA
Spain	24	30	0.95
Mexico	60	27	1.68

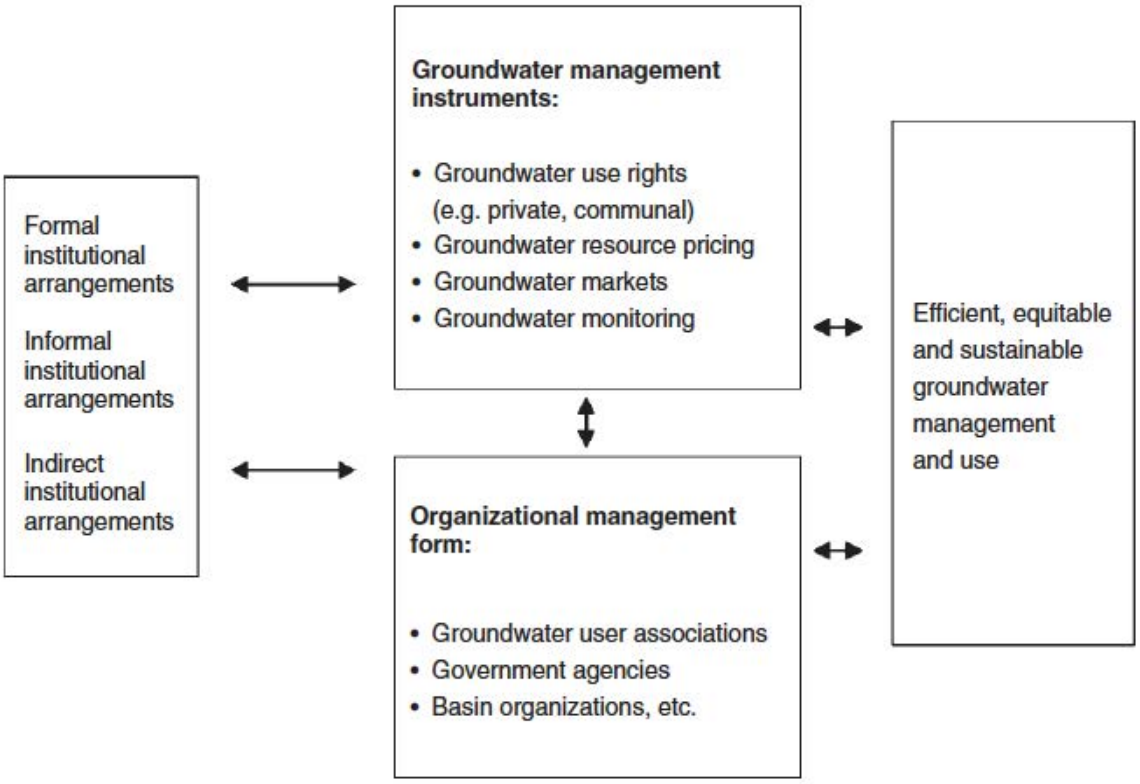
Source: Based on FAO AQUASTAT, quoted in Burke 2003

(Source: Mukerhji & Shah 2005)

Management frameworks and alternatives

There are a variety of institutional arrangements and instruments employed to address groundwater issues (see Figure 3). Institutional arrangements range from formalized to informal to indirect. The management instruments employed by the different institutions or combinations thereof are: a) groundwater use rights (private, communal), 2) groundwater resource pricing, 3) groundwater markets and groundwater monitoring. The governance structure can include: groundwater user associations, government agencies and basin organizations (Kemper 2007). According to the Food and Agriculture Organization of the United Nations (FAO) the challenges faced in current attempts at groundwater management are: 1) the lack of reliable hydrogeological data that limits management ability to predict aquifer functioning and to develop realistic rights systems; 2) Rights systems are difficult to design and implement in most situations for a variety of technical and economic reasons; 3) In most cases social acceptance of private rights may be problematic; 4) Aquifer management is politically complex because it would require active modification of established use patterns; 5) The dynamic nature of both socio-economic globalization and global climate change make management complex. People are increasingly mobile and often have little incentive to participate in long-term management initiatives (FAO 2003).

Figure 3: Schematic for the institutional framework for groundwater management



Source: Kemper 2007

Crafting sustainable institutions that adequately account for the dynamic processes of groundwater and the socio-economic complexities requires a flexible and adaptive approach (J. J. Burke et al. 2000; Maimone 2004; Moench 2007). Shah recommends that groundwater resource management must entail four important steps such as information systems and resource planning (discussed in the previous section), demand side management that puts in place an effective system for regulating the withdrawals to sustainable levels, supply side management and groundwater management in the river basin context (Shah et al. 2001). Burchi argues that in the designation of regulated rights, in the form of permits or licenses, the groundwater user has the incentive to restrain overuse while maintaining security of ownership (Burchi et al. 2001). *Security and flexibility* are recognized as fostering efficient resource use. Howe et al. takes this a step further indicating that institutions need to incorporate mechanisms to ensure resource security and relative certainty through the flexibility in rules-in-use and through the real and perceived striving for equality and reflection of social values (Howe et al. 1986).

Water rights may be viewed as secure if right holders are certain about the quantity, quality, location and timing of resource availability, the right is guaranteed to be intact over a fairly long period of time and the user is protected against uncompensated damage to the right by other individuals and public agencies (Garrido et al. 2003; M. L. Livingston 1995). However administration of rights via well registration and quantity restrictions is a tremendous and costly undertaking given the number of wells and the geographic spread (Shah 2008). Furthermore, enforcement of groundwater regulations via monitoring and sanctioning presents another institutional challenge (Schlager 2007).

According to Moench, the failure of groundwater governance strategies is caused by the social, economic and scientific disjuncture (Moench 2007). Some of the primary difficulties center on the rapid social and economic changes, that are not in sync with longer-term groundwater properties and, oftentimes, unavailable groundwater data. Moench argues that individuals that avert risk by diversifying there production and livelihood are more successful in times of crisis such as droughts than perhaps individuals who choose to dig deeper wells and thus do not exercise the muscle of risk aversion. Moench calls for an adaptive management approach especially in rural areas explaining that governance institutions may find it more promising to assist the community of users in strategies that reduce the reliance on groundwater resources versus the socially contested regulation of consumption amounts (Moench 2007).

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Mexico's water resource governance

Legal framework

In 1992 Mexico made significant constitutional revisions that created the framework for the decentralization of water resources. The nation is deemed the owner all hydrological resources and sublevel entities are responsible for the provision of water and sanitation services. In conjunction with the constitutional changes a new water law (LAN *Ley de Aguas Nacionales*) was established that provided the policy, objectives and mechanisms for the management of water resources: The following principles summarize the new approach to water resource management in Mexico[1].

- ***Water is the property of the nation***: Article 27 of the Mexican constitution designates the federal government as the owner of all hydrological resources (rivers, aquifers, lakes etc…) within in the nation's boundaries. In addition the government maintains the authority to transfer water rights as water titles and thus operate as private property.
- ***River basins management***: Water administration authority and management is transferred and divided into 13 hydrological administrative regions called "Organismos de Cuenca" (Figure 1). These administrative bodies are mirrored versions of the federal CONAGUA with the same structure and function. However these bodies are not financially autonomous and thus depend on the support of the federal body.
- ***Integrated water resource management***: Water management planning is coordinated between different sectors, agencies and administrative units. Each sublevel is responsible for integrated planning and reports that reflect the federal government's 2030 Water Agenda.
- ***Organized participation***: Within these administrative units a variety of water user stakeholders representing different sectors are organized into "*Consejos de Cuenca*" (Figure 1). Irrigation users are responsible for managing irrigation networks through water user associations (*Asociaciones Civiles de Usuarios*). In areas where groundwater is the primary water source citizen-based groundwater user association (*Comites Tecnicos de Aquas Suterraneas*--COTAS are organized to inform water users on aquifer conditions and regulations as well as monitor groundwater levels especially in overexploited basins.
- ***Federal concessions and public registry***: In adherence with the LAN, the allocation of water rights is done through federally deemed concessions to private users and municipal and state entities; this also includes permits for wastewater discharge. Permits and titles are made public and thus transparent through the Public Registry of Water Rights (*Registro Público de Derechos de Agua*—REPDA).
- ***Priorities for water provision***: As part of the National Water Agenda directive of universal coverage, a priority of use ranks water use by categories to ensure human consumption has precedence over all other uses. The following lists the priority order by category: Domestic, urban, livestock, agriculture, ecological conservation (environmental use), electric energy generation for public services and industrial use
- ***Water rights trading*** of concession titles. In areas where water resources are limited especially where new concession titles are prohibited, the transfer of water rights is made possible to maximize the economic value of the resource.
- ***Municipal provision of water and sanitation services:*** In alignment with the decentralized structure, Article 115 of the Mexican constitution designates municipalities as the providers

[1] OECD, 2013

and managers of water and sanitation services through direct management, municipally owned companies or private providers.

- ***Water use management to maintain or achieve water balance***: government water management planning and actions attempts to address water sustainability through environmental regulations and permits through CONAGUA. All levels of government have a role in determining environmental standards for water use and discharge.

In 2004 reforms were made to the National Water Law that gave greater administrative authority and legitimacy to the regional river basin organizations and river basin councils that are just now being played out on the ground in the policy planning and administrative duties arenas. The changes to the law were enacted to strengthen the roles and duties sub-national agencies and to fulfill the promise of decentralized governance. For example, the Baja California river basin council newly appointed presidency is no longer occupied by a CONAGUA official but instead a local resident and agriculturalist signifying a move toward greater authoritative autonomy.

Figure 1. Administrative-Hydrological Region 1: Baja California and River Basin Councils (***Consejos de Cuenca)***[2]**.**

Policy instruments for managing hydrological resources in Mexico

The 1992 new water law ushered in a suite of legal reforms that support the overarching policy objective of decentralized governance of environmental resources. CONAGUA is the federal agency with the greatest responsibility of administering and enforcing the laws related to water. Listed below are the policy tools, laws and management plans most relevant to the governance of water resources in Mexico.

[2] CONAGUA 2010 cited in SEMARNAT 2012

Water Management Tools

There are a variety of tools for managing water resources in Mexico that can be summarized into the following five categories: ***Regulatory, enforcement, economic, participative[3] and integrated.***

- ***Regulatory measures*** through concession titles, water use rights and in the case of groundwater systems there are three instruments to conserve overexploited basins and aquifers: prohibitions, reserves and regulations. Some of the more important federal regulations related to water resource management are listed below:

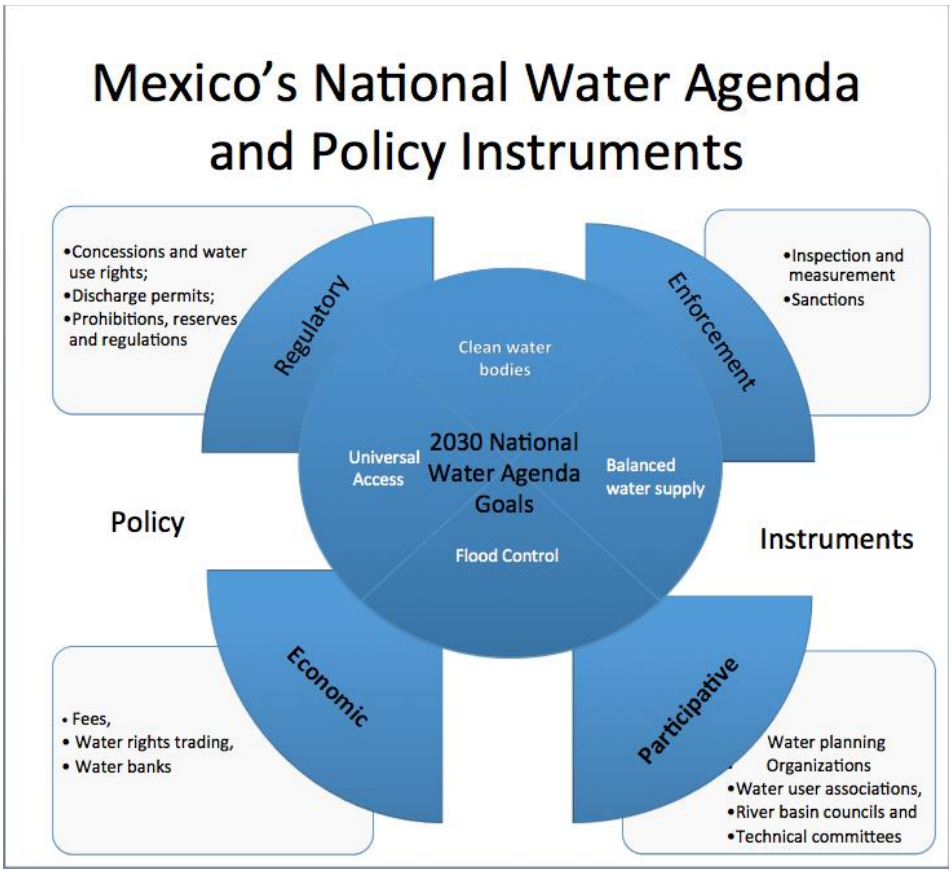
- ***Enforcement measures****:* Enforcement of the water sector regulations to control and manage the use and discharge of water resources is undertaken through field inspections, measurement of use and quality, and sanctions for misconduct.

- ***Economic mechanisms****:* The use of economic instruments to incentivize adherence to the established water resource policies and regulations follows the principles of "water user pays" and "polluter pays". Some of the mechanisms used to manage water resources include but are not limited to: water fee collection, water rights transfers and water bank operations.

- ***Participative institutions****:* Participation across scales, sectors and society in the management of water resources is an important policy tool. Participation in the planning, policy development and management takes place in a variety of contexts such as water user associations in irrigation districts, river basin councils (*Consejos de Cuenca*) and technical committees for groundwater resources (COTAS--*Comites Tecnicos de Aguas Subterraneas*).

- ***Integrated planning***: Each entity—Federal, state, regional, municipal and watershed (and in some cases urban centers) have their own hydrological planning reports that are integrated across institutional levels and agencies. Examples of some of the primary planning documents related to water resource management in the Ensenada Region are described by institutional level in following sections.

[3] OECD 2013.



In these regions under prohibitive use status groundwater users are encouraged to organize and form a groundwater user association (COTAS). The local groundwater association is civilian based but receives financial and technical support from State and federal water agencies (CONAGUA). COTAS mostly function as advisory bodies to the local groundwater users on groundwater regulations and information on groundwater conditions. COTAS also conduct experiments and monitor groundwater levels and quality. However, there are some significant challenges to COTAS. First, COTAS are limited in their capacity to self-govern since they do not have the power to make and decide upon the rules to meet the needs of the local conditions and community. Second, COTAS are vulnerable to 'elite capture' particularly in regions of high economic development.

Local governance is a common approach to addressing environmental issues especially in rural areas in less developed nations experiencing 'Tragedy of the Commons' (Hardin 1968) or natural resource deterioration due to overuse. Local governance is promoted by researchers, development agencies (i.e., World Bank) and governments as a more democratic and efficient method for sustainable resource management (see Ostrom 1990). Local governance is also known as participatory management, community-driven development, collaborative governance among others. This case study takes a closer look at the conditions under which local governance may arise and some of the potential outcomes.

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