# Building Peace through Integrated Water Resources Management

**Conceptual foundations for a revised approach to water resources development**

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## I. Introduction

Conflict is inherent in water resources management. This was one of the chief conclusions we reached three years into the implementation of the Global Water Initiative (GWI) in Central America. We encountered conflicts in virtually all of the communities where we worked, and addressing these conflicts required significant time, energy, and other project resources. Examples of these conflicts included:

- In Matagalpa, Nicaragua rural communities trying to protect water sources to ensure lasting access to safe drinking water were thwarted by large tobacco producers who continued to pollute local ground water aquifers, frustrating the communities' efforts.
- In San Juan, Honduras communities nearby the newly constructed water system and protected area vandalized infrastructure to protest their exclusion from the project.
- In Jocoaitique, El Salvador extreme political polarization led to the formation of rival water committees, both of which claimed to be the sole entity in charge of the water system.

Based on our experiences in Central America, this paper presents peacebuilding as an approach that improves the way we address conflict in the water sector, and which ultimately helps us achieve water management outcomes that are more efficient, equitable, and environmentally sustainable. We explain how combining peacebuilding with Integrated Water Resources Management (IWRM) strengthens water development strategies, as the frameworks and tools from both approaches are complementary and provide the means to understand and manage conflict more effectively.

Through our discussion of these concepts in this paper we aim to satisfy two ambitious goals:

a) Shift the focus of the debate surrounding water and conflict so that we can direct our attention to the right types of issues impacting local/regional water development initiatives

b) Revise the way we approach conflict around water in order to be more effective in achieving the outcomes we seek in water resources development and management

### *a) Shift the Focus*

In this paper we aim to shift the debate on water and conflict in a few specific ways. First, the focus on the idea of "water wars" has created the false impression that conflict related to water is tantamount to large-scale violence or warfare. We argue this is a distraction from the real problems that most people face on a day-to-day basis. Where we are actually encountering conflict is at the local and regional scales. These conflicts are typically harder to see, and they are rarely characterized by physical violence. This finding is also mirrored in the larger body of research on water and conflict (e.g. Giordano et al. 2002; Gleick 2008). The bigger issue we are

finding is that conflict impedes meaningful development efforts, leading to a lack of progress as evidenced by poor health, economic stagnation, and other forms of poverty.

A second shift in the water and conflict debate is to recognize most conflicts that communities face are, at their core, not rooted in water resources. What tends to happen is that, given water management (done right) requires that diverse stakeholders come together to craft a shared vision of their water resources future, the presence of underlying social or political conflict only becomes apparent when you begin to deal with water.

The third way we aim to shift the water and conflict debate regards the issue of water scarcity.[1] Physical water scarcity, at least in Central America, is not the primary driver of water-related conflict. For example, we work with communities in northern El Salvador that receive up to two meters (over six feet) of rainfall annually, yet conflict over aspects of water management is common. The overarching problem we find is that institutions and governance systems are not in place to manage water efficiently, equitably, and sustainably. As a result, water is wasted, and often water infrastructure is poorly used or abused, which exacerbates any underlying conflicts.

*b) Revise the Approach*

The second goal of this paper is to influence the way we approach conflict in the water development sector. Chiefly, we must move beyond the idea of "resolving conflicts" – akin to stomping out fires as they spring up – in spite of notable successes achieved by local project partners through conflict resolution. From our experience, we learned (the hard way) that the traditional conflict resolution approach is limited, and possibly detrimental, if it is viewed as the primary way of addressing problems that arise in the course of water development interventions.

From a peacebuilding perspective, conflict is an inherent component of human relationships. When viewed in the right light, we can move beyond perceiving conflict as just an obstacle to development, to recognizing conflict can be a catalyst for transforming unjust social relations and structures of interaction. Conflict is not an isolated event in need of resolution, but rather the result, or a symptom, of the larger and more complex social system that water development interventions are couched within. Adequately managing and transforming conflict requires a holistic approach that addresses the root causes of conflict.

Lastly, the analysis that we provide in this paper has been directly influenced by the research of Elinor Ostrom and her colleagues on natural resource governance (e.g. Ostrom 1990, Ostrom 2009). In this way, we seek to lend further credence to the widespread importance of Ostrom's framework for understanding resource governance – a holistic process that encompasses both human institutions and natural systems – as well as place our discussion of peacebuilding and IWRM within the wider context of the discussions taking place both among practitioners and academics in the field.

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[1] Water scarcity is often interpreted to mean less water, but is actually recognized as "the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements to the extent that the demand by all sectors, including the environment, cannot be satisfied fully" (UN 2006)

## II. Background

The juxtaposition between the abundance of water resources and incidence of conflict, both violent and non-violent, in Central America is reflected in our analysis of conflicts encountered over the course of GWI in the region (Table 1). GWI staff observed multiple examples of similar types of conflicts across project sites, and even multiple instances of the same fundamental conflict within a single project site. Many of these conflicts we observed were not directly related to issues of water, but were the result of pre-existing social tensions (e.g. political polarization), differing interests (e.g. burning land for pastures versus cultivating agroforestry systems), and other issues stemming from the complex dynamics of human relationships and society. Table 1 provides a summary of these multiple types of conflicts and their frequency.

Table 1: Matrix of the different types of conflicts encountered over the course of GWI in Central America. The table displays that multiple types of conflict were typically present in a single project area, and some types of conflict were encountered more frequently than others.

| **Case** | **Country** | Differing Goals for Land-use | Acquiring and Protecting Water Sources | Installing Infrastructure On Private Lands | Water System Admini-stration | Pre-existing Social Tensions | Excluded Neighbor-ing Com-munities |
|---|---|---|---|---|---|---|---|
| Las Ventanas | Guatemala | | X | | | | X |
| Coatancito | Guatemala | | | X | | X | |
| San Juan | Honduras | X | X | | | | X |
| Congolon | Honduras | X | X | X | X | X | |
| San Antonio | Honduras | | X | | X | | |
| Santa Martha | Nicaragua | X | X | X | | | |
| Las Gavetas-Las Lomas | Nicaragua | X | | X | X | | |
| Esquipulas | Nicaragua | | X | | | X | |
| San Fernando | El Salvador | | X | | X | | |
| Jocoaitique-Arambala | El Salvador | X | | X | | | |
| Los Quebrachos | El Salvador | | | | X | X | |
| Agua Zarca | El Salvador | | X | | X | | |

The information in Table 1 indicates that we encountered two or more types of conflict in each site where GWI worked (where information is available). In many cases, most notably Honduras, managing these conflicts ended up consuming the majority of the time and energy of GWI staff. According to one GWI program manager in Honduras, at one point the majority of all field work focused on resolving conflicts, which were inhibiting with the ability to complete projects efficiently. The categories of conflict (adapted from Gehrig and Rogers, 2009) used in Table 1 encompass all the unique causes of conflict we documented in GWI in Central America, and only two of the categories, "Acquiring and Protecting Water Sources" and "Water System Administration," encompass elements of physical water scarcity. However, none of the specific conflicts recorded under these two categories were actually the result of absolute scarcity, but rather dealt with issues of private property rights and conflicting historic claims to water resources.

The specific conflicts that we encountered through GWI ranged from interpersonal disputes to system-wide, structural violence[2] in the form of unfair policies. Although GWI has faced violence – everything from verbal threats and destruction of infrastructure, to actual shots fired – the violence was limited in scale. These experiences mirror previous research findings (e.g. Gleick 2008) that physical violence over water resources rarely develops beyond the local scale, and there are many incentives in place to prevent large-scale water conflict – the so-called "water wars" – and, instead, promote peaceful solutions (e.g. Postel and Wolf 2001; Carius et al. 2004; Wolf 2007; Priscoli and Wolf 2009). The bigger issue we uncovered in Central America – and we suspect other water-rich regions of the world will share a similar story – is not necessarily conflict over water resources, but conflict inhibiting local water resources development and other development efforts.

In light of these revelations, we began exploring approaches for resolving conflicts in our project sites. Table 2 provides brief definitions of several key terms that we repeatedly use in our discussion, and which are important to understand before proceeding.

Table 2: Definitions of key terms used in the paper

| |
|---|
| **Conflict Resolution** is a term that emerged in the 1950s to describe the theory and practice of solving differences without resorting to violence (Lederach 1997; Lederach et al. 2007; Zelizer 2013). Conflict resolution focuses primarily on three key elements: 1) People (parties directly involved in the conflict), 2) Process (how the conflict is being addressed), and 3) Problem (the issue in dispute). Currently, the term is more narrowly defined as having to deal with addressing immediate problems and is related to specific tools and approaches, including mediation, negotiation, and facilitation, and is also used with similar terms including conflict mitigation, conflict management, alternative dispute resolution. |
| **Integrated Water Resource Management** is an approach to water resources development, and broadly water resources governance, that focuses on participatory decision-making processes and spaces for managing shared water and related resources that respect the legitimate needs of all water-users and other stakeholder groups, including the environment. (GWP 2009) |
| **Peacebuilding**[1] represents an ongoing process in which multiple actors and actions converge to transform conflicts, relationships, and the systems in which they are embedded. Peacebuilding takes different forms in different contexts, but the overarching goal is always to reduce violence and move toward more sustainable, peaceful relationships and governance models and structures. (Galtung 1975; Lederach 1997; Zelizer 2013) |

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## III. Identifying Shared Concepts in IWRM and Peacebuilding

Water possesses unique properties that set it apart from all other natural resources, and which make water especially complicated to manage. The specific characteristics of water relevant to our thesis in this working paper are the following:

[2] The term "violence" is not synonymous with physical harm, but encompasses any situation in which a particular population is repressed or otherwise denied the same opportunities and dignity as others. (Galtung 1969)

- Water is a basic human need, *fundamental* to sustaining life and society. A few weeks without water can ruin a crop; all natural ecosystems require water to survive; virtually all economic activities require water, whether directly or indirectly.

- Water is a *renewable* resource. Unlike petroleum or rare earth metals, water is capable of replenishing itself on a human timescale (with the notable exception of deep groundwater aquifers, so-called "fossil water"). While every individual's withdrawal from a common well diminishes the quantity that remains for others' use, the water can reasonably be expected to replenish through good management of the resource.

- Unlike other renewable resources, such as timber, water is a *mobile* resource. At the local, regional, and transnational scales, water is perpetually progressing downward through a watershed, both above and below ground. On a global scale, water is continuously cycling through the atmosphere, over land, and through the subsurface.

- On account of water's mobility, water is inherently *integrative* by nature, a shared resource. Whether or not we are always aware of it, water meaningfully connects the lives of all people (and everything else) living within the same watershed. Multiple user-groups consume water for multiple purposes, and every use has a tangible impact on the stock that remains, in terms of quantity, quality, and timing of delivery. For example, quantity and quality of water at the point in a stream where the intake for a drinking water system is located is affected by everything that happens upstream.

These key characteristics of water help point to why water is both a source of conflict and cooperation; everyone needs water, and the actions of every individual have the ability to impact all other water-users sharing the same water resource. The ability of water to integrate human society and natural ecosystems helps explain why water management is so complex, and frequently a source of conflict. Elinor Ostrom's framing of natural resource governance further helps solidify this view of water resources management, emphasizing the importance of not just biophysical properties of water, or water infrastructure, but on two other sets of variables: water-user groups and water governance systems. Ostrom's framing of natural and social systems as interconnected components of a larger "social-ecological system" (Ostrom 2009) helps illustrate why a limited focus on physical water resources, or water infrastructure, as well as resolving immediate conflicts is often unable to bring about the efficient, equitable, and sustainable results that water development projects seek to foster.[3]

Unfortunately, Ostrom's research does not discuss methodological implications for accomplishing the difficult task of managing both the natural and social spheres in the context of governing complex natural resources, like water. Peacebuilding and IWRM both highlight different aspects of governance processes, and further provide the approaches and tools to help solve complex problems stemming from the interactions and feedbacks among water resources, water-users and other stakeholder groups, and governance institutions.

[3] We save discussion of the details of Ostrom's framework for understanding resource governance as a complex "social-ecological system" for a subsequent paper.

*a) What is IWRM?*

There is no one concise definition of Integrated Water Resources Management, but the Global Water Partnership (GWP) – a proponent of IWRM – describes it as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." (GWP 2000) In this sense, "IWRM is itself a political process because it deals with reallocation of water, the distribution of financial resources, and the implementation of environmental goals." (Rogers and Hall 2003, p.30)

A general strength of IWRM is that it emphasizes the importance of the human dimension – water-users, stakeholder groups, and institutions – of water development, which historically was not prioritized in traditional, engineering-focused approaches to water management. IWRM is a participatory, inclusive, and multi-stakeholder process, and must necessarily address conflicts as they arise between parties with diverging goals for water resources management. While IWRM has its own set of tools for managing water resources, and specifies the need to "establish 'rules' to resolve disputes," it is not an approach that specializes in managing conflicts, especially ones that are not rooted in water resources.

*b) What is peacebuilding?*

Peacebuilding is a term that emerged in the 1990s and may be best understood as a "range of approaches, processes and stages needed for transformation toward more sustainable, peaceful relationships and governance models and structures." (Morris n.d.) Additionally, building peace "requires the redress of legitimate grievances and the establishment of new relations and spaces for interaction characterized by equality and fairness according to the dictates of human dignity and the common good." (Philpott and Powers 2010, p.23) The fundamental objective of peacebuilding is to transform the underlying structures and patterns of human interactions from which conflict arises, such that the new system promotes justice and non-violence.

Peacebuilding begins with recognizing conflict as a natural part of human relations, and by extension, the process of development. Peace is not synonymous with the absence of conflict; peace is the ability to manage and transform conflict, which is, and will always be, part of human society (Lederach 1997). From a peacebuilding perspective, whether or not the differences among individuals become a source of division and violent conflict, or an opportunity for positive change and growth, depends on how they are understood and addressed. Accordingly, peacebuilding focuses on key stakeholders, their relationships, the problems they face, and the processes that have evolved around them to structure interactions. While peacebuilding does not address water resources in particular, the integrative nature of water makes water resources an excellent medium through which to build peace.

*c) Building peace through IWRM*

Both peacebuilding and IWRM deal with how people address differing visions of development, build consensus to make inclusive and equitable decisions, and structure relationships and patterns of interaction around important issues of mutual interest. IWRM identifies the

importance of bringing multiple water-users and stakeholder groups to the table to plan and make decisions regarding how shared water resources are managed, and recognizes this is an inherently conflictive process. As the demand for water increases, as it continues to do globally, IWRM is an increasingly contentious process, and managing conflict becomes an even more demanding part of the process. Peacebuilding sharpens and enhances IWRM's focus on participatory governance structures and systems of interaction, and provides guidance for navigating the often difficult process of reconciling divergent visions of development, resolving manifest conflicts, and identifying potential conflict situations. IWRM importantly provides the contextual foundation – water resources management – for building peace, which is further enhanced by the integrative nature of water resources.

The following table compares and contrasts shared elements between IWRM and peacebuilding.

Table 2: Key conceptual elements shared by IWRM and peacebuilding

| *Key Principles of IWRM* | *Key Principles of Peacebuilding* |
|---|---|
| **Integrative:** Water resources cannot be managed as independent sectors (human consumption, irrigation, hydro-power, etc.) because water use for any one sector influences the quantity, quality, and timing of delivery of water available for all others.<br>**Interdependent**: Water resources are shared by many different users. There is a direct relationship between water users upstream and downstream. The actions of one user directly affect all others, so managing water resources requires cooperation among users.<br>**Open and transparent:** Water governance institutions should work openly and responsively. Decision-making processes should operate as inclusively and transparently as possible. The quality of governance depends on ensuring not only broad participation and transparency but also accountability for the results it produces.<br>**Equitable and ethical**: Water is necessary for life, and a critical input for livelihoods. Equitable access to, and use of, water is paramount for human health and economic development. Nobody should be excluded from accessing water, and the rules for managing access and usage should be clear and consistently applied. | **Integrative:** Peacebuilding connects the current state with the vision for the desired one in the future. It requires responding to the crisis and linking it to creating a platform and processes for long-term change.<br>**Interdependent:** The nature and quality of relationships are connected. We live in a social system that is characterized by interconnectedness, where people, whether or not they or conscious of it, depend on one another.<br>**Comprehensive:** Peacebuilding requires a global vision of the problem, people, relations, institutions and systems. Constructive relationships include the cultivation of interdependence, governability, and shared economic prosperity, as well as the promotion of communication and transparency through all sectors and levels.<br>**Architectural:** Peacebuilding is "architectural" in the sense that it pays attention to the ways in which processes are designed, how spaces are structured and created for people to come together, and how mechanisms and institutions support change processes. |

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## III. Tools for Combining IWRM and Peacebuilding

This section highlights key tools that can help practitioners formulate and implement IWRM-peacebuilding interventions that promote sound water development and minimize the negative impacts of conflict. Both IWRM and peacebuilding already have their own corresponding sets of tools, and our objective here is to highlight synergies within the respective toolboxes. Specifically, we focus on several tools from peacebuilding that fit nicely within the established frameworks and processes of IWRM. These tools are: 1) Conflict Analysis, 2) the Actors Triangle, and 3) the Integrated Peacebuilding Framework. We also introduce a fourth tool – Social Network Analysis – that reinforces the common ground between peacebuilding and IWRM, and helps sharpen the focus on patterns of relationships and structures of interaction, yet is not a tool that is native to either approach.

### *1) Conflict Analysis*

Conflict analysis constitutes an in-depth examination of the social context in the area(s) where development interventions will be taking place. Conflict analysis offers the biggest potential for return on investment in terms of time, energy, and efficient use of limited project resources when it is conducted at the outset of interventions, as it and can be used to identify and manage potential sources of conflict, and help navigate through the inevitable conflicts that do arise. It is important to note that conflict analysis is not limited to ongoing, observable conflicts, but should broadly examine the social, political, institutional, and cultural context underlying a given project area. Latent, ongoing, and future conflicts are almost always symptoms of injustices in these larger, more complex systemic variables.

The process of conflict analysis involves both external analysis conducted by NGOs and other development actors, as well as participatory analysis conducted in conjunction with local actors. Taken in the context of water resources development, the core of conflict analysis involves investigating, reflecting on, discussing, and ultimately defining the following elements for the area of intervention:

- **Who?** Identify the key actors and agents that will be involved with, affected by, or otherwise have a stake in, water resources development and management in the project area(s). These include water-user groups, community leaders, local and national government authorities, NGOs, and all other groups with a legitimate stake – or a perceived legitimate stake – in planned development interventions in the area. Relevant actors should be considered both in terms of their institutional scope and geographic locations, keeping in mind that important actors may not be physically located near the project site, or even in the watershed, but their scope of work nonetheless gives them a stake in the area (e.g. national environmental ministries, seasonal cattle ranchers).
- **What?** Review the history and context of the overall situation, including any potentially latent, ongoing, or possible future conflicts. In Central America, the recent history of civil war and ongoing political instability are important antecedent factors that impact social relations in ways that will affect the process of water development in communities. Inter-personal conflicts are even harder to detect, especially for an outside development actor, but can nevertheless impact interventions and should be identified, if possible.

- **Why?** Understand the root causes and long-term factors underlying conflict, including political, economic, social, and other relevant structural factors. Identifying these elements is a key aspect of building peace; transforming these variables to reinforce equitable and just structures of interaction represents the nuts and bolts of peacebuilding.
- **How?** Uncover the dynamics of conflictive processes, including how conflicts are unfolding, long-term patterns of conflict, triggers for violence, capacities for managing conflict, and likely future conflict scenarios. Understanding this information helps map out the development process, including defining indicators for monitoring and evaluation.

Conflict analysis is an important tool and critical first step in any water development initiative, regardless of whether interventions will take place within an obvious conflict situation, or a particularly conflictive part of the world, like Central America. Simply working to implement IWRM – responding to the competing demands of differing visions of development, building water systems, protecting water sources, fostering good governance – has the potential to generate conflict (not necessarily violence) among local water-users and other stakeholders. At a minimum, our objective should be to "do no harm" in project areas, and ideally interventions will have a positive influence on the underlying systems from which conflicts arise (Anderson 1999; Bush 1998; Paffenholz and Reychler 2007; Zelizer 2013).

*2) Actors Triangle*

The Actors Triangle (Fig. 1) is a useful prognostic tool that helps facilitate the examination of key actors, relationships, and relational spaces. While it is commonly applied to situations where some form of injustice or outright conflict is present, the Actors Triangle is more broadly applicable. It is useful both as a tool for designing conflict management strategies for ongoing conflicts, as well as for identifying potential sources of conflict stemming from injustices in the underlying social system.

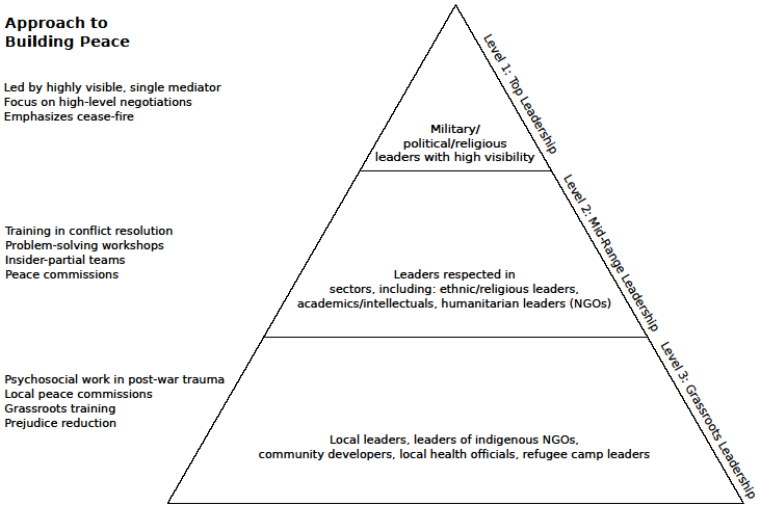


Figure 1: Actors Triangle, adapted from J.P. Lederach (1997)

Combining contextual information gleaned from conflict analysis with relational information from the Actors Triangle can provide a good idea of the relationships, platforms, and institutions for structuring interactions that need to be built in order to resolve, or reduce the likelihood, of conflicts (Lederach 1997). In fact, conflict analysis should be viewed as a necessary first step, as without information about the context in which actors and their relationships are situated, the Actors Triangle has little prescriptive utility. While the Actors Triangle is widely utilized in peacebuilding, it has received relatively little attention in IWRM, in spite of its utility in helping make sense of the multitude of water-users and other actors in complex, multi-stakeholder water governance arrangements.

The Actors Triangle highlights the importance, and unique contributions, of different kinds of actors in peacebuilding processes. There are three distinct levels to the Actors Triangle – base, middle and top – with a different set of groups of actors associated with each level. The base level includes groups like local leaders and community associations. The middle level is comprised of civil society groups, including NGOs and local government authorities. The top level is composed of groups comprising national government agencies and others with officially recognized power and authority. In the context of IWRM, these same levels of actors remain important, as actors at each level bring different skills, knowledge, and other resources to bear for governing shared water resources. The Actors Triangle can help practitioners strategically build and strengthen relationships among diverse actors, in function of the different roles of each level of actor, and the unique resources different types of actors possess.

*3) Integrated Peacebuilding Framework*

The Integrated Peacebuilding Framework (IPF) provides guidance for working at varying scales, and through time, to build and strengthen structures promoting peaceful relations (Lederach 1997). This tool further helps practitioners work toward the long-term governance aspects of IWRM, including helping link water management to broader development strategies in other sectors, crafting a shared vision of the future among multiple water-user groups and other stakeholders, and establishing indicators and mechanisms for monitoring progress and revising strategies (GWP 2009).

On the vertical axis, the IPF (Fig. 2) accounts for multiple levels of actors, ranging from individuals to complex organizations, as well as multiple levels of analysis, from individual relations to patterns and structures of relationships. The circles are nested to convey the sense that each level influences the other, and must build off each level that comes before it. Any holistic process of long-term change usually has to work through issues on each of these levels. On the horizontal axis the tool shows the progression of phases for planning through time. Each phase has particular issues that will need to be addressed and the types of activities needed.

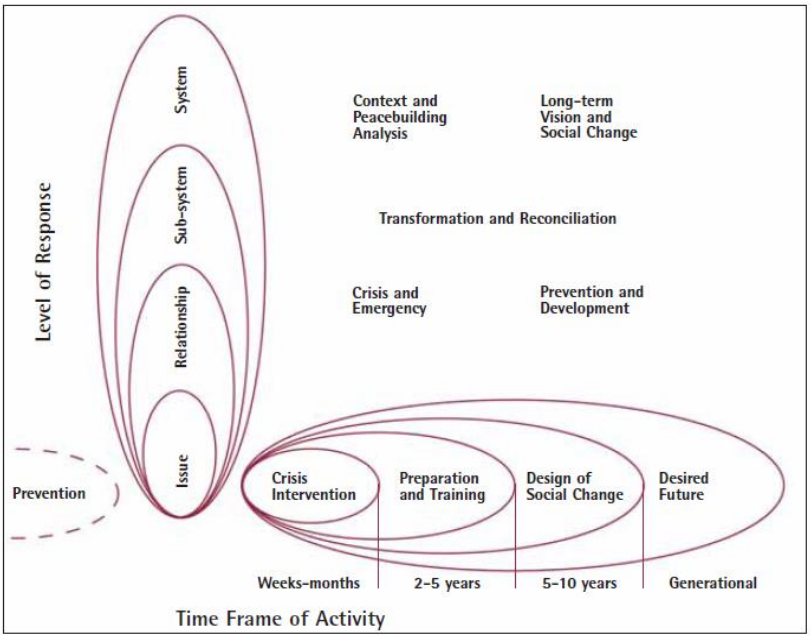


Figure 2: Integrated Peacebuilding Framework (Lederach 1997)

Just as the Actors Triangle can map both what exists in terms of relationship and point to the gaps in horizontal and vertical linkages, the IPF applies the principles and processes of

peacebuilding, demonstrating what needs to be done at different levels and at different points in time. This perspective is helpful for examining long-term protracted conflict, and also for addressing complex social issues that impact the efficiency, equity, and sustainability of water governance institutions.

IPF is necessarily a participatory tool, and the first step in its application consists of helping stakeholders and user groups develop a positive, shared vision of their desired future. Once the desired outcome is defined, the IPF can be used by these groups to periodically assess the current reality and trajectory, and begin designing the changes they will need to make during each of the subsequent phases in order to achieve their goals. By developing a long-term vision groups can move beyond the immediate problems and look at the situation in terms of the future they desire, not just the avoidance of immediate, negative problems or the most immediate needs, like getting access to clean drinking water, but also looking at the long term sustainability of the resource base. The desired future, whether ten, twenty, or more years away, will impact current decisions regarding the trajectory for reaching the goal. The IPF also helps give focus to issues of long-term sustainability that are critical when it comes to governing water resources, as well as cultivating change in terms of longer processes and not just short-term projects.

*4) Social Network Analysis*

While it is not currently considered a peacebuilding or IWRM tool, we believe Social Network Analysis (SNA) is an important emerging tool for facilitating IWRM-peacebuilding interventions, specifically as it relates to understanding stakeholder relations in the context of water governance. SNA may actually be best viewed as enriching the tools and approaches previously discussed, specifically the Actors Triangle, as opposed to representing a unique tool in its own right.

SNA specifically refers to an analytical approach for gathering, analyzing, and applying information about actors and relationships, which is an integral component of peacebuilding. SNA helps to make sense of the range of different actors that have a stake in water resources governance in a given area, the relationships that exist (or are absent) among them, as well as characteristics of these relationships, such as strength of relationship or the type of relationship. One of the key strengths of SNA is that it is sufficiently flexible to model a wide range of situations, including IWRM and water governance processes, and is adept at handling the inherent complexity of social systems. SNA is able to handle any kind of social-relational information that may be desirable to analyze in an IWRM setting, including:

1) The *type* of relationships actors may share. Relationships between actors – individuals, organizations, and both formal and informal institutions – can take many forms, such as collaborating on projects, providing funding or other material resources to support initiatives, or discussing strategies for governing shared water resources.
2) The *direction* of relationship. That is, whether a relationship between two actors is reciprocal – both actors give and receive – or one-directional.
3) The *strength* of relationship. Not all relationships are equal – some may be weak, some may be strong. This impacts whether cooperation or conflict is the dominant form of interaction.
4) The *level* of relationship. That is, both horizontal and vertical relationships.

SNA can further assist peacebuilding and IWRM practitioners in making sense of complex arrays of, and relationships between, water-users and other stakeholder groups by its ability to incorporate different characteristics of actors, including:

1) The *type* of actor. Examples include community group, NGO, local government, civil society, etc.
2) The *position* of an actor. That is, whether an actor is considered an ally, opponent, or neutral party with respect to a particular project, proposal, etc.
3) The *interest* of an actor. Successful IWRM programs must account for a multitude of actors with diverse interests or water management objectives (e.g. agriculture, human consumption, industry, etc.).

Network diagrams (see Fig. 3), or actor maps as they are typically called in practice, are one of the key products obtained through SNA. Actor maps are graphics that display some or all of the previous information about actors and relationships. This tool can help IWRM and peacebuilding practitioners visualize risks and opportunities for intervening in an area, based on the structure of relations that exists at present among key actors. For example, when key actors are isolated, or located at the periphery of the social network, there is a high risk they may act as spoilers who seek to undermine programmatic interventions (Carlsson and Sandström 2008). Therefore, it is important to devise ways to build or strengthen relationships with marginalized actors so that they come to see themselves as a more integral part of the program's success.

We are currently working to develop and operationalize SNA within a peacebuilding and IWRM context to help us deepen our understanding of local circumstances and relationships between water-users and stakeholder groups, and understand why certain water governance efforts have, and have not, been successful. An example of how we are working to incorporate SNA into interventions, using a real-world example from GWI in Honduras, is provided in Figure 3.[4] One of the challenges of using SNA is that it is entirely defined by the user, and great care must be taken to define what constitutes a relationship. For instance, in the context of IWRM, we are likely only interested in relationships between actors in the context of water governance processes, and therefore would not include a link between two actors that only collaborate on a rural electrification project.

Combining the Actors Triangle with actor maps as obtained through SNA is particularly useful for critically examining the array of actors, the density of relations, the ratio of horizontal and vertical relationships, and how cohesive the system is (Bodin and Crona 2009). While the Actors Triangle touches on the importance of horizontal and vertical relationships – commonly referred to as "bonding" and "bridging" relationships, respectively – the power of visualization provided by SNA helps demonstrate exactly how and why they are important, especially when it comes to managing conflict, or potentially conflictive situations.

[4] This image is one of a series chronicling the evolution of water governance relationships in a case study from San Juan, Honduras. The case study, and application of the actor map-triangle tool, is a detailed in a forthcoming paper.

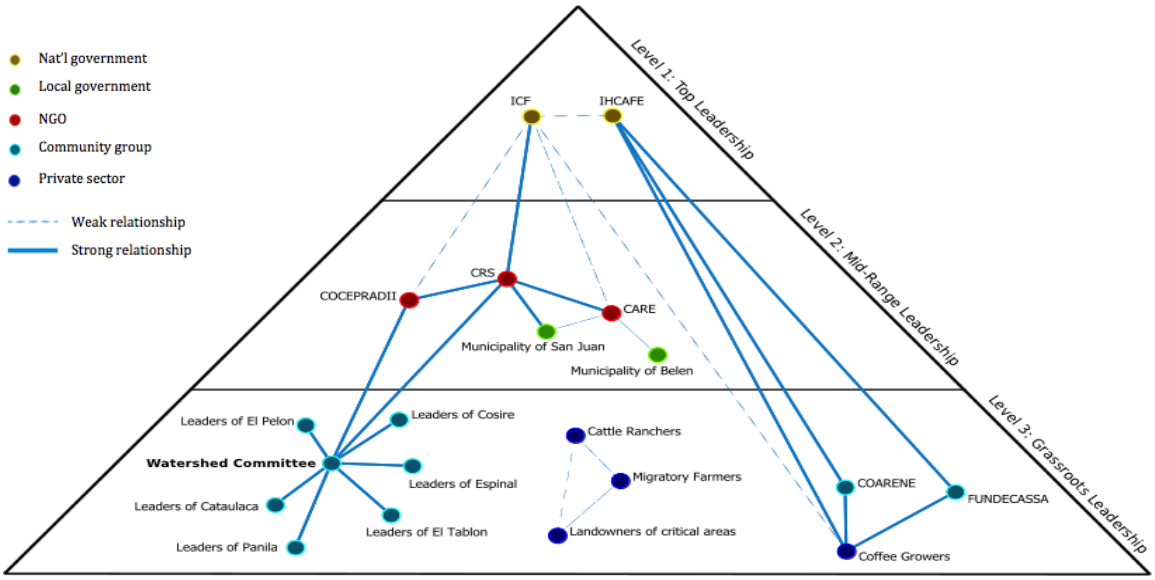

Fig. 3: A combined actor map-triangle highlighting relationships in the context of water governance processes among key actors in a rural watershed development initiative in southern Honduras.

Peacebuilding and IWRM both promote the formation of *bonding relationships* – connections among the actors on any one given level – to foster greater cohesion among similar actors. These horizontal connections among similar actor types help strengthen relations, build social capital, and create opportunities for collective action. Similarly, both peacebuilding and IWRM aim to foster *bridging relationships* among actors that operate at different levels. Vertical connections help connect diverse actor types with kinds and amounts of resources. The importance and unique contributions of both horizontal and vertical relationships in resource governance has been well established (Ostrom 1990; Pretty and Ward 2001; Bodin and Crona 2009).

Social cohesion within and among user groups becomes critical for understanding social dynamics, and identifying broken relations or key actors who, by connecting them, could make a significant difference in resolving or managing conflict situations. The actor map-triangle in Figure 3 allows us to see, for example, not only the need to create inter-group cohesion (bonding) for a group of farmers that want to better manage a hillside water source, or a community that wants to better manage its potable water system, but also to connect those groups to regional authorities and organizations (bridging) to better manage the whole watershed. Water governance is chiefly about linking water-users and other stakeholder groups within and between levels to facilitate and coordinate the complex processes required to manage water resources to deliver the three "Es" of IWRM: equity, efficiency, and environmental sustainability.

## IV. Conclusions

Much of the thinking on water and conflict emphasizes the potential for large-scale, violent conflict over scarce water resources – water wars. While it's important to be aware of the current and future risks of large-scale conflict, the discussion is sometimes sensational, and can be a distraction to the types of conflict people (especially the poor) face every day. Based, on our

field experiences implementing IWRM in Central America – supported by a growing body of evidence on water and conflict – water conflict is primarily local, frequent, and pervasive.

The following is a summary of our key findings:

Water scarcity is not the main driver of water-related conflict in Central America. The primary driver is poor management of available resources creating unnecessary scarcity. Central America has abundant rainfall but people suffer from a lack of access to quality water if water resources are not managed better than they are currently.

The purpose of managing conflict is not primarily to prevent violence – rarely are the conflicts we counter violent. The more fundamental problem with conflict is how it stifles human and community development. In terms of the goals of IWRM, conflict prevents progress toward achieving economic efficiency, social equity, and environmental sustainability. Conflict is often invisible, but made evident in the lack of social or economic development – which is poverty.

With IWRM, what we ultimately seek is the formation of institutions, relationships, tools, and skills to manage water resources – and to do so in a way that constructively deals with the conflicts that inevitably surface in the process of managing water resources. We understand that conflicts are rarely isolated events, but are symptoms of injustices (imbalance of power) in the underlying social system. Our approaches need to go beyond reacting to immediate conflicts and encompass a much larger framework that analyzes conflicts as being imbedded in social, political, and economic systems. To this aim, peacebuilding addresses the systemic issues of violence.

Combining peacebuilding with IWRM provides a systems-level perspective that can help identify system-level problems and guide appropriately scaled solutions. Both IWRM and peacebuilding recognize the ubiquity of conflict in development, and both help shift the focus away from conflicts as isolated events in need of resolution, but rather as symptoms of conflict or injustices in the underlying social system. While IWRM recognizes the importance of conflict management, peacebuilding brings conflict front and center, and enriches the tools and approaches of IWRM. At the same time, the unique properties of water as a shared resource make it an exceptional platform peacebuilding efforts.

Peacebuilding goes beyond conflict resolution to focus on building relationships among people involved in conflict. For water management, the network of actors that affect one another is broad. And peacebuilding approaches highlight the need to build relationships among peers and neighbors (horizontal relationships) and between groups at different levels (vertical relationships). These relationships create the trust and social capital for people to communicate with one another, at multiple levels, making dialogue easier when conflicts arise. The peacebuilding frameworks suggests that whenever one group is excluded from the process of managing shared water, and related land, resources there is a high potential that the excluded group will disrupt the management process.

Another key contribution of peacebuilding to the IWRM process is the focus on building a shared vision for the management of water resources among the various groups of water users

and other stakeholder. This shared vision becomes a touchstone for groups to return to when conflicts inevitably arise.

Finally, water resources are complex and dynamic – water supply is always changing (literally with the weather) and the demands are also dynamic (almost always increasing) - so it's critical that the tools and approaches we use for water management are adaptive.

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