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Challenging The “Man” In Mangroves: The Missing Role Of Women In Mangrove Conservation

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Abstract

Mangroves provide valuable ecosystem services including carbon sequestration, pollution filtration, and protection from tsunamis, tropical storms, and coastal erosion. They also supply coastal communities with important natural resources like firewood, medicine, timber, honey, and fodder for livestock. Unfortunately, the world’s mangroves are rapidly degrading due to rising coastal population, climate change, and destruction for coastal development, agriculture, and aquaculture. Considering their value for the environment and coastal communities, mangrove conservation should become a priority and effort must be invested to find new and successful methods for conserving mangrove ecosystems. As it has proven effective in other conservation contexts, a gendered perspective on mangrove conservation should be adopted. Through review and synthesis of existing literature on gender and mangrove conservation, this paper will show the extent to which gender analysis has been used to examine mangrove conservation and coastal resource management. It will describe the following trends in literature: a) a lack of research focusing on gender’s role in mangrove conservation, b) confusion about the practical applications of a gender, environment, and development (GED) conceptual framework c) little effort to evaluate the success of programs that integrate gender and mangrove conservation. It will make suggestions for future research and encourage further use of a gendered outlook on mangrove conservation and resource management.

Keywords

mangrove, mangrove conservation, social perspective, community-based conservation, power relations, gendered perspective, feminist political ecology, gender analysis, Women in Development (WID), Gender Environment and Development (GED), gender mainstreaming

Disciplines

Environmental Health and Protection | Environmental Sciences

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Mangroves provide valuable ecosystem services including carbon sequestration, pollution filtration, and protection from tsunamis, tropical storms, and coastal erosion. They also supply coastal communities with important natural resources like firewood, medicine, timber, honey, and fodder for livestock. Unfortunately, the world’s mangroves are rapidly degrading due to rising coastal population, climate change, and destruction for coastal development, agriculture, and aquaculture. Considering their value for the environment and coastal communities, mangrove conservation should become a priority and effort must be invested to find new and successful methods for conserving mangrove ecosystems. As it has proven effective in other conservation contexts, a gendered perspective on mangrove conservation should be adopted. Through review and synthesis of existing literature on gender and mangrove conservation, this paper will show the extent to which gender analysis has been used to examine mangrove conservation and coastal resource management. It will describe the following trends in literature: a) a lack of research focusing on gender’s role in mangrove conservation, b) confusion about the practical applications of a gender, environment, and development (GED) conceptual framework c) little effort to evaluate the success of programs that integrate gender and mangrove conservation. It will make suggestions for future research and encourage further use of a gendered outlook on mangrove conservation and resource management.

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Introduction

The term mangrove refers to a large group (somewhere between 40 and 70 species) of shrubs and trees. Mangroves flourish in tropical, saline, intertidal zones and serve an important purpose for the people of coastal communities and for the world at large (Spalding et al., 2010). The list of resources provided by mangroves is long and includes charcoal, firewood, honey, medicine, and fodder for livestock. Mangrove ecosystems also act as nurseries for fish, crabs, prawn, and mollusk (Spalding et al., 2010; Stone et al., 2008). Coastal communities depend on the resources provided by mangroves for subsistence (Dahdouh-Guebas et al., 2000; Glaser, 2003; Iftekhar & Takama, 2008; Spalding et al., 2010; Stone et al., 2008) and commercial production (Glaser, 2003; Iftekhar & Takama, 2008; Spalding et al., 2010). In addition to the valuable resources they provide to coastal communities, mangroves also have a wide range of environmental benefits. They act as coastal protection from tsunamis and tropical storms, help to hold coastlines together by trapping sediments in their roots (Kathiresan; Spalding et al., 2010; Stone et al., 2008), keep groundwater clean by preventing seawater from entering inland, and stop the spread of metal pollution by absorbing heavy metals in their sediment (Kathiresan). Despite being smaller in area than other forests, mangroves have a significant amount of below-ground biomass. This large amount of biomass allows mangroves to play an essential role in mitigating the affects of global climate change through carbon sequestration, or the diversion of carbon from the atmosphere below ground (Kathiresan; Spalding et al., 2010). According to the

International Union for Conservation of Nature and Natural Resources (IUCN), mangroves are estimated to provide \$1.6 billion per year in ecosystem services (IUCN, 2010). Spalding et al. (2010) argue that mangroves are more valuable economically per unit area than any other land use, including tourism, aquaculture, and agriculture.

Unfortunately, the world's mangroves are under threat. Mangrove ecosystems are rapidly degrading due to factors like population pressures, rapid coastal development (D'Agnes et al., 2005; D'Agnes et al., 2010), destruction for shrimp aquaculture (Armitage, 2002; Chowdhury, 2007; Ronnback et al., 2007; Spalding et al., 2010), rising sea levels caused by climate change (IUCN, 2010) and deforestation for economic purposes (Ronnback et al., 2007; Zorini et al., 2004). IUCN (2010) claims that more than one in six species of mangrove worldwide is in danger of extinction. Mangroves on the Atlantic and Pacific coasts of Central America are particularly threatened. Almost 40 percent of all mangroves in these areas are considered to be in danger (IUCN, 2010). Mangrove degradation is also a serious problem in India and Southeast Asia where 80 percent of all mangrove area has been lost over the past 60 years (IUCN, 2010). Considering their important benefits for people and the environment and their threatened condition, conservation of mangrove ecosystems should become a priority as we advance into the future and attempt to achieve the goal of environmental sustainability.

Although ecological restoration is an important aspect of mangrove conservation, achieving sustainable conservation and management requires an approach that goes beyond ecological concerns. Power dynamics and relations within coastal communities affect how mangrove conservation is carried out, who makes mangrove conservation decisions, and who controls mangrove resources. Therefore, it is important to consider social circumstances and power relations when implementing conservation policy and creating conservation management

programs. This review of literature on mangrove conservation, demonstrates that many researchers recognize the importance of using a social perspective to examine and implement mangrove conservation management. For example, articles often examine the way that different members of societies perceive and value mangrove ecosystems (Maliao & Polohan, 2008; Ndaruga & Irwin, 2003; Ronnback et al., 2007; Stone et al., 2008) and demonstrate that power differences influence who makes conservation decisions and who benefits from them (Armitage, 2002; Hue, 2006; Siar, 2003). Many articles also promote community-based conservation, or conservation that incorporates the ideas of local stakeholders who depend on mangroves (Armitage, 2002; Dahdouh-Guebas et al., 2000; Mohs, 2006; Soontornwong, 2006; Torell et al., 2010; Walters, 2007). However, despite emphasis on community conservation, consideration of power differences, and recognition of differing control over and dependence on mangrove ecosystems, there is a tendency to overlook the role that gender plays in mangrove conservation.

As Le (2008) explains, factors such as wealth, age, origins, and gender all intersect to define rights and roles within communities. In the context of mangrove conservation, gender is a factor that is particularly important to consider. Men and women, with different positions in society, use mangroves differently. They have unique perspectives about why mangroves are important and how they should be protected. For example, as Siar (2003) determined, women and men in Honda Bay, Philippines value different resources and species of fish. Generally, women in Honda Bay value intertidal and near-shore species of fish and crustaceans that thrive in mangrove ecosystems and are used for subsistence purposes. Men place a higher value on the commercially viable species of fish that thrive in off-shore coral reefs (Siar, 2003).

Unfortunately, as Siar (2003) noted, in Honda Bay, men's space tends to be perceived as more important and women's fishing needs are seen as secondary or supplementary. This has

implications for biodiversity conservation because if women's perspective and knowledge of intertidal resources and species is not respected or understood, these species could suffer from greater degradation (Siar, 2003). As Siar (2003) noticed in Honda Bay, and other studies conducted in different regions have confirmed, dynamics of power and control can encourage the marginalization of women (D'Agnes et al., 2010; Hue & Scott, 2008; Le, 2008; Torell et al., 2010). Studies have also confirmed that this marginalization often causes women's perspectives on mangrove (Glaser, 2003; Walters, 1997) and coastal (D'Agnes et al., 2005; Siar, 2003) conservation and use to be overlooked and undervalued.

In order to overcome women's marginalization and incorporate their perspectives into mangrove conservation, it is necessary to bring a gendered perspective to conservation management questions. A gendered perspective on conservation looks at power dynamics and relations between men and women specifically. It fits within the framework of feminist political ecology, recognizing the way that factors like class, caste, age and gender intersect to shape use, value and access to resources and control over conservation decision-making (Rocheleau et al., 1996). It encourages the reshaping of power relations to encourage social equity and gender equity at all levels of conservation management.

A gendered perspective on mangrove conservation would help to include marginalized women in the conservation process and would provide a more holistic, equitable and successful mangrove conservation approach. These positive results of a gendered approach to conservation have been noted in other conservation contexts. To illustrate, Agarwal (2010) conducted a study of Community Forest Institutions (CFIs) in India and Nepal, measuring the connection between the number of women in the executive and decision-making bodies of CFIs and forest health. Forest health was assessed using factors such as the villagers' perception of change in forest

canopy and condition, the researcher's perception of change in forest health, and satellite images showing forest growth. It was found that CFIs with more than two women on their executive committees showed significant improvements in these forest health indicators. Agarwal (2010) noted several reasons why including women in executive committees improved conservation results. When women had a role in forest conservation they felt a sense of ownership over the forest, wanted to help conserve it, and were more willing to enforce protective measures. Women also shared their unique knowledge of forest products and sustainable extraction methods and encouraged cooperation among other village women. By participating in forest conservation and management, not only did forest health improve, but women benefitted as well. Women were able to voice their opinions and gain access to the forest resources that they depended on while still furthering the goals of sustainable management (Agarwal, 2010). Including women in executive committees is a gendered approach to conservation, challenging power relations and finding a way to include the voices of marginalized women in decision-making. Considering the positive results of this gendered approach to forest conservation in terms of improved forest ecosystem health and progress toward equity, it is valuable to examine mangrove conservation through a similar gendered lens.

Literature on mangrove conservation that incorporates gender shows the extent to which gender analysis (i.e. analysis that looks at complex systems of power and differences in resource use, access, and control between men and women) has been used to examine mangrove conservation and why gender analysis is useful. Through review of peer-review and gray literature that mentions gender in mangrove conservation, this paper demonstrates the following trends: a) a gender-gap in research on mangrove conservation b) confusion about the practical applications of a GED conceptual framework and c) little effort to evaluate the success of

programs that integrate gender and mangrove conservation. Based on these observed trends, the paper will make suggestions to improve current use and promote future use of gender analysis in mangrove conservation.

Study Methodology

In order to gather the literature necessary for review and analysis, the following online research databases were searched: Environment Complete, Academic Search Premier, Gender Studies Database, Scopus, Contemporary Women's Issues, Google Scholar, and World CAT. Searches were conducted using the keywords "mangrove*" AND "community*", "mangrove*" AND "gender*", "mangrove*" AND "woman*", and "mangrove*" AND "women*" (Table 1). Gray literature was included in searches to broaden results. Articles and texts that used a social perspective, examining the connection between humans and mangrove conservation, or articles that mentioned community based conservation, were selected for review. 57 articles fit this category. If these selected articles and texts also incorporated gender into their discussion of the social aspects of conservation, mentioning gender in their text or focusing on gender throughout their study, they were set aside for further review and analysis. 26 articles resulted from this process, which were divided by region, coded and grouped into categories based on observed patterns, and described in an annotated bibliography.

Regions were based on a system provided in the World Atlas of Mangroves (Spalding et al., 2010) and the number of articles in each region was counted (Table 2). A coding system for the literature was devised based on three categories used to determine the following: (Category 1) how often the concept of gender is mentioned in literature on mangrove conservation, (Category 2) how literature portrays gender differences between men and women, and (Category 3) the types and success of strategies currently being used to conserve mangroves (Appendix).

In the first category, articles were divided based on how often they mentioned gender. Articles coded as “Low” only briefly mentioned gender. In articles coded as “Medium”, gender is not a central part of the argument, but is still discussed in some detail. In articles coded as “High”, gender is integrated throughout the work (Table 3). The second category was comprised of a series of questions designed to assess any stereotypes that articles presented about women and men in communities. The questions were also designed to determine whether the article focused on power differences in general and power differences between men and women in particular. In the third category, articles were divided based on their theoretical approach to gender and their solutions for integrating gender into mangrove conservation (Table 4). Articles were grouped based on two prominent theoretical frameworks related to feminist political ecology: Women in Development (WID) and Gender, Environment and Development (GED).

A WID perspective often assumes that women are innately connected to nature and the environment and also tends to equate economic development and conquest over nature with masculine domination over women. A WID viewpoint therefore argues that women should be targeted in development and natural resource management programs because they have been dominated by men, empathize with dominated nature, and will ultimately be better stewards of their environment, caring for nature rather than conquering it (Braidotti et al., 1994; Shiva, 1989; Tinker, 1990). Critiques of the WID perspective suggest that it may inadvertently encourage a deepening of power imbalances. For example, because WID targets women, it can unintentionally place an extra burden on them and make their lives more difficult. When WID-based solutions are employed, women become responsible for conservation and resource management decisions and programs, often in a culture where they have little time or political power to implement programs or enforce management decisions. Furthermore, by focusing on

women, WID can sometimes exclude men and discourage their support, or make it more difficult for women to gain respect from men in the community and harder to achieve gender equality (Braidotti et al., 1994; Elmhirst & Resurreccion, 2008).

In response to this critique of the WID perspective, scholars have taken a new outlook that claims a more comprehensive and holistic view, focusing on both men and women and the idea of gender as a socially constructed and changing concept. This perspective is referred to as Gender Environment and Development (GED). The GED perspective examines the ways that gender roles, culture, social status, and material conditions influence peoples' relationship with the environment. It stresses the need to identify and challenge power relations to ensure equitable access to resources and equal participation in natural resource management (Elmhirst & Resurreccion, 2008). Gender mainstreaming is a practical application of the GED framework and a strategy for integrating gender into conservation. The latest development in the GED framework is a focus on the idea of gender mainstreaming, formally defined by the United Nations Economic and Social Council (1997) as the :

...process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes...so that women benefit equally and inequality is not perpetuated.

After articles were grouped based on their theoretical approach to gender in conservation, their practical strategies for integrating gender into mangrove conservation were also examined and divided based on the WID and GED framework. This division helped to demonstrate how frequently gender mainstreaming and GED objectives are applied to mangrove conservation.

Finally, a series of questions focused on evaluation of gendered strategies to mangrove conservation. These questions were used to determine whether gendered approaches to mangrove conservation were evaluated after implementation to demonstrate their success or failure. Overall, by using this three category coding system, and by dividing articles based on region, trends in the reviewed literature could be identified and analyzed.

Results and Discussion

How often is gender mentioned in literature on mangrove conservation? Regional results

Globally, gender is rarely included in studies on mangrove conservation. To illustrate, in a preliminary keyword search of scholarly databases, adding “gender*”, “women*”, or “woman*” to the keyword “mangrove*” dramatically reduced the number of hits (Table 1). Closer examination revealed that many of these hits did not actually deal with gender and mangrove conservation. Often articles argued that a social perspective should be used to examine mangrove conservation, but failed to include gender issues in their conception of a social perspective. When articles did incorporate gender, it tended to be tangential to larger examinations of the societal aspects of mangrove conservation (Table 2: Low-Medium mentions of gender). There were also regional differences among those articles that incorporated gender issues into their discussion (Table 3). There is a higher concentration of studies examining gender and mangrove conservation in South-East Asia, while fewer studies are focused on gender and mangrove conservation in areas such as North and Central America and the Caribbean and South America. This is particularly troubling considering the highly threatened status of mangroves in Central America (IUCN, 2010). Gendered examinations of mangrove conservation are completely absent from other regions, such as West and Central Africa, The Middle East, East Asia, Australia and New Zealand, and the Pacific Islands (Table 3). These

regional trends can perhaps be explained by the fact that the highest diversity of mangroves is found in South-East Asia (Spalding et al., 2010).

However, mangroves everywhere are in danger and a new approach to conservation, which uses a gendered perspective and includes both men and women, should be devised to conserve them. Filling the gender-gap in areas where gendered research on mangrove conservation is currently lacking would be a start to successfully devising this new strategy. Before this gender-gap can be filled however, it is important to come to a consensus about what a gendered strategy entails. This gendered strategy should then be implemented in ways specific to the communities of the unique and varied regions where mangroves are located. In order to create consensus and devise strategies for implementation, it is necessary to first examine the way that gender is currently being discussed in literature on gender and mangrove conservation and the methods suggested for employing a gendered approach to mangrove conservation. The next section describes the 26 reviewed articles that included gender in their discussion of mangrove conservation, explaining the articles' approaches to conservation, definitions of gender and power relations, and their ideas about gendered roles in society.

Portrayal of Male and Female Roles

Most of the 26 reviewed articles laid out a similar conceptual framework to explain their approaches to mangrove conservation. To illustrate, 23 of the articles discuss or advocate the idea of community-based conservation management, or conservation management that accounts for the needs of local communities and involves them in the process of creating and implementing conservation policies (Armitage, 2002; Chowdhury, 2007; D'Agnes et al., 2005; D'Agnes et al., 2010; Dahdouh-Guebas et al., 2000; Glaser, 2003; Hue, 2006; Hue & Scott, 2008; Iftekhhar & Takama, 2008; Le, 2008; Maliao & Polohan, 2008; Mohs, 2006; Ndaruga &

Irwin, 2003; Siar, 2003; Soontornwong, 2006; Srinath, 2008; Stone et al., 2008; Thamizoli, 2001; Torell et al., 2010; USAID, 2001; Veach, 1996; Walters, 1997; Wells et al., 2007). Some authors stress the idea that community-based conservation should account for power differences within societies (Siar, 2003; Stone et al., 2008; Soontornwong, 2006) and that it should challenge “entrenched” power relationships (Armitage, 2002). Many integrate power relations into their discussion of community-based conservation (D’Agnes et al., 2005; D’Agnes et al., 2010; Iftekhar & Takama, 2008; Maliao & Polohan, 2008, Ndaruga & Irwin, 2003; Torell et al., 2010) and argue that community participation should take place on a deeper level, including not just the most powerful members of society, but also marginalized members of society who may otherwise be ignored (Glaser, 2003; Hue & Scott, 2008; Hue, 2006; Le, 2008; Soontornwong, 2006; Walters, 1997). Hue (2006) states that local communities are highly heterogeneous and Soontornwong (2006) explains the importance of recognizing differences within communities when implementing natural resource management:

Access, and the ability to restrict it, is vital for the ability of local communities to properly manage the mangrove forests. Since access is often controlled by people and groups with power, it is especially important to guarantee access for more marginalized groups within the community...they need to be involved in the [conservation management decision-making] process to guarantee their rights of access in community management plans.

Gender shapes access and marginalization and influences community-based conservation management. Of the 23 articles that focused on power dynamics, 16 articles recognized the role that gender plays in shaping power relations (Chowdhury, 2007; D’Agnes et al., 2005; D’Agnes et al., 2010; Glaser, 2003; Hue, 2006; Hue & Scott, 2008; Iftekhar & Takama, 2008; Le, 2008;

Mohs, 2006; Siar, 2003; Srinath, 2008; Thamizoli, 2001; Torell et al., 2010; USAID, 2001; Veach, 1996; Walters, 1997; Wells et al., 2007). These authors demonstrate that there are gendered differences in terms of access to natural resources (Hue & Scott, 2008; Siar, 2003, Hue, 2006; Le, 2008); in dependence on natural resources (Iftekhhar & Takama, 2008); in control of natural resource management (Mohs, 2006; Hue, 2006; D'Agnes et al. 2005); and effects of resource conservation initiatives (Srinath, 2008; Walters, 1997).

There are also gendered differences in terms of resource use and valuation. Of the 26 reviewed articles, 22 point out gendered differences in mangrove use (Armitage, 2002; Chowdhury, 2007; D'Agnes et al., 2005; Dahdouh-Guebas et al., 2000; Glaser, 2003; Hue, 2006; Hue & Scott, 2008; Iftekhhar & Takama, 2008; Le, 2008; Maliao & Polohan, 2008; Ndaruga & Irwin, 2003; Roonback et al., 2007; Siar, 2003; Soontornwong, 2006; Srinath, 2008; Stone et al., 2008; Thamizoli, 2001; USAID, 2001; Veach, 1996; Walters, 1997; Wells et al., 2007; Zorini et al., 2004). For example, in a study conducted in the coastal zone of Banawa District, Central Sulawesi, Indonesia, researchers examined a variety of important local uses of mangroves and products derived from mangrove ecosystems. They divided each of these uses and products based on gender, explaining whether each mangrove use and product was valuable for men, women, or both (Armitage, 2002). Another study conducted in coastal zones of Kerala, India explained the importance of various coastal resources for both men and women and the different ways that men and women exploit and depend on coastal resources (Srinath, 2008).

Thirteen of the twenty-two articles that recognize gendered differences in mangrove use show that gendered differences in mangrove use influence perspectives about how and why to conserve mangroves (D'Agnes et al., 2005; Glaser, 2003; Hue, 2006; Maliao & Polohan, 2008; Ndaruga & Irwin, 2003; Ronnback et al., 2007; Siar, 2003; Soontornwong, 2006; Srinath, 2008;

Stone et al., 2008; Thamizoli, 2001; USAID, 2001; Veach, 1996). For example, a study of teachers' perceptions of wetland conservation in Kenya noted gendered differences in perceived threats to wetland areas. The study asked teachers who had attended a workshop on wetland conservation to answer a questionnaire with a Likert scale assessing which threats to wetlands they perceived to be most significant. The study showed that there was a relationship between gendered roles and perspectives about wetland conservation. Because women were in charge of most of the farming and agricultural activities in Kenya, they understood the effects of farming on wetlands differently than men and rated threats like soil erosion and farm chemicals as less significant than men rated them (Ndaruga & Irwin, 2003). Another study conducted in Honda Bay, Palawan, Philippines made a similar observation, describing that women value different resources than men and depend on different mangrove products for their livelihood, which influences their perspectives on conservation. Women tend to value sea cucumbers, shells, and invertebrates supported by mangroves in the intertidal zone, where men value fish living in offshore reefs (Siar, 2003). These gendered differences in resource valuation and dependence have important implications for mangrove conservation and biodiversity conservation in general. As the article explains:

When women lose access to the intertidal zone because they are displaced by competing activities...or as a result of resource depletion, the situation is not considered as serious because women's fishing is looked upon as secondary or supplementary. Many initiatives in coastal resource management are focused on the management of coral reef fisheries (rather than intertidal mangrove areas) and reflect the importance attached to men's space vis-à-vis women's space (Siar, 2003).

As Siar (2003) suggests, and many other studies confirm (D'Agnes et al, 2005; Glaser, 2003; Hue, 2006; Le, 2008; Mohs, 2006; Siar, 2003), unequal power relations can lead to marginalization of women (Hue, 2006; Le, 2008) and can prevent their unique and valuable perspectives on mangrove and natural resource management from being considered (D'Agnes et al, 2005; Glaser, 2003; Mohs, 2006; Siar, 2003).

Among the 26 reviewed articles that deal with gender issues in mangrove resource management, a common conceptual framework seems to exist. Although feminist political ecology is not mentioned specifically as the framework guiding these articles, many of their ideas are congruent with the ideals of feminist political ecology (Rocheleau et al., 1996). For example, they focus on the need to address power differences within communities and specifically between men and women, to recognize gendered patterns of resource use and resulting gendered perspectives on conservation, and to include the views of marginalized women in resource management in order to create equal power relations and holistic conservation approaches. However, although there is recognition that a gendered perspective is needed, strategies and suggestions for incorporating gender into existing mangrove conservation models are lacking.

Types of Strategies Currently Used to Conserve Mangroves

Many authors describe the importance of a gendered perspective, but fail to explain how gender should be integrated into conservation management programs (Glaser, 2003; Hue & Scott, 2008; Iftekhhar & Takama, 2008; Siar, 2003). Others offer methods to address inequality in mangrove management but do not focus specifically on gender inequality (Hue, 2006; Le, 2008). One study in Cogtong Bay, Philippines notes the importance of considering gender issues in the

evaluation of mangrove conservation projects, but does not explain how to practically implement a gendered perspective (Maliao & Polohan, 2008). As Vernooy & Fajber (2006) report:

Most of the social and gender analysis in natural resource management is primarily at the conceptual level. There are few effective learning programmes that focus on systemic capacity building for gender and social analysis in applied research in this field.

When solutions for integrating a gendered perspective into mangrove conservation are offered, they tend to be very basic and vague. For example, a study conducted in the Philippines simply suggests that, “Mangrove restoration projects need to consider their potential impact on...vulnerable groups (like women)” (Walters, 1997). Another study focused in Bangladesh notes the need to adopt “gender-sensitive strategies” and lists various goals such as, “making sound environmental management, risk management, and gender equality an integral part of sustainable development” (Chowdhury, 2007). However, none of these goals are explained in detail and there are no suggestions as to how these goals can be implemented in Bangladesh. A thesis describing research conducted in coastal areas of Ecuador provides an excellent gendered analysis of the areas it examines, describing male and female roles and perceptions of mangrove management. It makes suggestions for improving mangrove conservation management, suggesting “...training in organization building...” and affirming that, “it will...be essential to give women a central role in this process” (Veach, 1996). However, despite its excellent explanation of power dynamics and gender relations, it does not offer any kind of specific strategy for overcoming barriers to gender equality in natural resource management other than giving women a “central role” in organization building (Veach, 1996). It should be noted that vague solutions are better than no solutions at all and that suggesting some way of integrating

gender and mangrove conservation is a step in the right direction. Even vague solutions raise awareness about the importance of a gendered approach to mangrove conservation.

Other studies do propose some useful solutions for the incorporation of gender concerns into mangrove resource management. These studies take several different approaches to integrating gender concerns and mangrove conservation, and there seems to be some confusion about which approach is the most beneficial. Many scholars and researchers are attempting to take a GED perspective toward analysis and description of gender issues in mangrove conservation, examining and addressing power relations between men and women. However, when it comes to practical applications, such as suggesting and implementing strategies that integrate gender issues into mangrove conservation and encouraging gender mainstreaming, it seems there has been confused and limited progress toward GED objectives (Table 4).

For example, despite use of gender analysis to examine male and female roles in society, one study of mangrove management in East Africa suggests solutions based entirely on WID assumptions (Zorini et al., 2004). The study makes the observation that “mangrove users who endanger the forest are men.” It implies that because men destroy the mangroves, women are inclined to protect them. This is in line with the WID assumption that women are more caring for the environment. Because the study accepts the WID idea that women are benign environmental stewards, it suggests that women’s use of mangroves should not be modified. It further explains that:

...our aim was to find ways to regulate the over-exploitation by men. Thus it was important to focus on them and to provide them with alternative sources of income, so as to reduce the pressure on mangroves. For this reason, we sought to identify alternative work activities for the men only (Zorini et al., 2004).

There are several other studies that also operate from a GED perspective, but actually propose solutions derived from the WID framework (Mohs, 2006; Stone et al., 2008; Thamizoli, 2001; Torell et al., 2010; Wells et al., 2007; Wells et al., 2010). For example, Mohs (2006) describes the results of a mangrove restoration project initiated by a non-governmental organization (NGO) in India. Mohs (2006) claims that the NGO's projects have created a "... shift in the gender roles of the community" because men have begun to participate in some traditionally female duties, such as childrearing and household chores, and women have begun to express their opinions and take a role in village leadership. Mohs (2006) also explains that before the project was implemented, "there was a specific power structure within the villages". However, aside from these assertions, the rest of the discussion about gender is focused on women only. Mohs (2006) explains that the NGO created self help groups to "enable the women to access formalized credit for self employment" and that women were encouraged to take a key role in mangrove conservation efforts. They were responsible for "... raising (mangrove) seeds into saplings and planting the saplings" (Mohs, 2006). Mohs (2006) argues that the existing power structure was challenged because "women feel that they have a greater input at the community and family level" and "... [they] have taken up other income activities...to provide additional income outside the mangroves." She also explains that the community now has a "woman panchayat leader...which was absolutely unheard of before" (Mohs, 2006). Although it does seem that the NGO made progress by empowering women, it is unclear whether power relations within the community were actually challenged, whether men's opinions of and respect for women was affected, and whether gender equity was truly achieved.

Stone (2008) examines the perspectives of fisherwomen, fishermen, and rice farmers on mangrove restoration in India. Her goal is to gather preliminary information in order to design a,

“fair and equitable restoration plan” (Stone, 2008). Despite her study’s focus on equity, which is in line with the GED framework, she makes the WID-based assumption that women are more likely to participate in mangrove restoration because they want to provide for their communities. In her study, researchers ask fisherwomen questions about the influence of the community on their interest in mangrove restoration but fail to ask fishermen or rice farmers the same questions. They use women’s answers to these questions about community to make the argument that, while males have seemingly self-interested and economic motivations for mangrove restoration, ...fisherwomen may have altruistic motivations for their involvement in reforestation.

Any proposed reforestation plan should have proper mechanism to help women channel this underlying motivation into increased restoration participation (Stone, 2008).

Stone (2008) further promotes WID ideals by arguing for women-led community enterprises and initiatives to manage non-timber mangrove products and focusing on the necessity to include women in restoration projects. Despite her goal of creating mangrove restoration that promotes equitable benefits, her study seems to overlook the issue of power dynamics and targets women rather than challenging existing gender relations.

Where some implement WID solutions, others use a GED discourse and implement a combination of WID and GED strategies (Wells et al., 2007; Wells et al., 2010). To illustrate, a mangrove restoration project in coastal Tanzania claims to be taking a GED perspective to mangrove conservation. However, it focuses mainly on including greater numbers of women in its programs rather than challenging existing power hierarchies. However, the project’s methods do seem to empower women, encourage their participation, and take an important step toward gender equity (Wells et al., 2007; Wells et al., 2010). To determine whether the project actually

meets GED objectives, and whether the level of respect for women in the community actually increased, more monitoring and evaluation is necessary.

Others use the GED discourse and suggest solutions that do seem to take a GED framework, focusing on challenging power relations between men and women. Although there are attempts to challenge gender hierarchies with GED-based strategies, approaches vary greatly. There is a lack of evaluation to show the success of implemented approaches and therefore no consensus about which approaches are the most effective. For example, a document published by United States Agency for International Development (USAID) that provides an overview of gender and community conservation outlines a GED method for encouraging gender equality and improved conservation efforts, indicating that women should be more involved in resource management leadership. It suggests creating a “women’s association of leaders and professionals” and “training (to)...prepare men to work professionally with women” (USAID, 2001). It also explains that, “...new areas that have yet to be characterized as ‘women’s work’ or ‘men’s work’...provide opportunities to employ equal numbers of women and men” (USAID, 2001). Although these solutions seem to be focused on encouraging gender equality, the article does not offer any case studies to explain where these methods have been employed and whether or not they are successful. Srinath (2008) offers a different GED-based approach, describing the idea of creating self-help groups for men and women to encourage biodiversity conservation in India. However, although Srinath (2008) does mention men and describe the influence of self-help groups on male interactions with the environment, the self-help groups are generally targeted toward women, and it is difficult to assess whether the groups actually promote gender equality. D’Agnes et al. (2005) and D’Agnes et al. (2010) examine another type of GED-based approach to challenging existing power relations and encouraging gender equity. This approach,

tested in the Philippines, integrates issues in reproductive health and coastal resource management. It implements a GED perspective by combining traditionally female and male areas of concern and encouraging both genders to participate in addressing these issues. The goal of the project is to encourage both population control and environmental stewardship through the same program. As D'Agnes et al. (2005) explain:

The reproductive health project component allows the project to attract women to coastal management activities, increasing their participation in community management boards and governance structures. Such gender-sensitive programming allows women to participate fully in management of the resources they depend on for livelihood and food. An added benefit is the project's focus on involving men in their family's family planning decisions, empowering them to take responsibility for traditionally female issues...

Although this particular project has been shown to be successful in the Philippines (D'Agnes et al., 2005; D'Agnes et al., 2010), the integrated coastal resource management and reproductive health approach has not been widely employed or tested elsewhere. Of the few studies that offer GED-based approaches to integrating gender and mangrove conservation, there is great variation in implemented strategies and little effort to evaluate these strategies.

Success of Strategies Currently Used to Conserve Mangroves

Overall, few strategies (particularly strategies based on a GED framework) for integrating and mainstreaming gender in mangrove management have been designed, employed, and tested. Minimal effort to propose, implement, and evaluate gender mainstreaming in mangrove conservation, means that opportunity for consensus about effective gender mainstreaming is limited. More research is necessary to determine which approaches to gender mainstreaming are

the best and where these approaches should be employed. Of the reviewed studies, only six have some kind of empirical evaluation component to test the success of their proposed strategy (D'Anges et al., 2005; D'Agnes et al., 2010; Malia & Polohan, 2008; Torell et al., 2010; Wells et al., 2007; Wells et al., 2010). D'Agnes et al (2005) and D'Agnes et al (2010) evaluate the impacts of an Integrated Population and Coastal Management Program in the Philippines (described above). They use indicators in reproductive health, coastal resource management and food security to measure the success of the Integrated Population and Coastal Management program (D'Agnes et al., 2005; D'Agnes et al., 2010). Measurements of indicators such as mangrove and coastal ecosystem health and likelihood of contraceptive use are compared to a control site and help to assess the project's progress toward its objectives (D'Agnes et al., 2005; D'Agnes et al., 2010). However, although the studies use comprehensive evaluation schemes, they do not measure success in terms of gender equity. Another method of evaluation used by Torell et al (2010) in Thailand, Nicaragua, and Tanzania involves what are called "empowerment indicators." They test the ability of implemented livelihood strategies to "create stronger social ties, improve coordination with local government, (and) develop...business skills" (Torell et al., 2010). Although the indicators successfully measure changing power relations within the community as a whole, they again fail to address gender dynamics or relations between men and women.

Wells et al. (2007) and Wells et al. (2010) examine a mangrove conservation project in Tanzania and employ a more comprehensive form of evaluation, looking at ecosystem health and attempting to measure gender equity. Wells et al. (2007) evaluate the success of the project through ecosystem health indicators such as percent mangrove cover, tree height and species diversity. They measure gender equity by calculating the percentage of women involved in

leadership and conservation activities (Wells et al., 2007; Wells et al., 2010). This measurement is a step in the right direction, but could be improved to further determine whether gender relations and existing power dynamics were truly challenged by the project.

Maliao & Polohan (2008) have the most successful study in terms of evaluation, measuring both ecosystem health and gender equity in Cogtong Bay, Phillipines. Their study uses “equity, efficiency, and sustainability impact criteria” to evaluate the Cogtong Bay Mangrove Rehabilitation Project and analyzes perceived impacts based on gender. Maliao & Polohan (2008), “...demonstrate the necessity of integrating gender issues into the evaluation of MPA (marine protected areas) to ensure a robust evaluation”. They use household income and perceived access to mangrove resources as indicators of equity and note gendered differences in both of these indicators (Maliao & Polohan, 2008). These measures of equity are a good starting point for assessing whether mangrove conservation programs have fair and equal benefits.

In addition to these indicators of equity, it would be beneficial for projects to record the number of women involved in leadership as Agarwal (2010) does in her study of forest conservation and Wells, et al. (2007, 2010) examine in their Tanzanian mangrove conservation project. Recording the number of women in leadership positions helps to show changes in control of decision-making. Another method for recognizing progress toward gender and social equity would involve questioning men and women from varied economic and social backgrounds about perceived benefits from and influence over conservation management decisions. This would help to further determine and critically analyze who holds power and whether conservation projects successfully address inequality to create equitable conservation programs.

Developing a common framework for evaluation of mangrove conservation programs that includes thorough assessment of equity, gender relations, and ecosystem health is essential.

Studies that have implemented evaluation measures are taking a step towards establishing this common framework. With further improvement and refinement of evaluation techniques and measures, a successful assessment of mangrove conservation programs can be developed. Once established, a common assessment for mangrove conservation programs would provide a valuable system to determine which methods for integrating gender and mangrove conservation are most effective. It would show where, how, and why they are effective and would help to uncover areas where improvements need to be made. It might also help to reduce confusion about the practical applications of the GED framework, by revealing strategies that achieve GED goals and objectives and create successful gender mainstreaming.

In addition to creating a common framework for project evaluation, it is also necessary to demonstrate empirically the connection between gendered approaches to mangrove conservation and improved mangrove ecosystem health. Evaluations of the Integrated Population and Coastal Management project in the Philippines show the success of integrating reproductive health and coastal resource management in terms of mangrove ecosystem health (D'Agnes et al., 2005; D'Agnes et al., 2010). Unfortunately, none of the other 24 reviewed works show any kind of empirical connection between gender mainstreaming in natural resource management and strengthened mangrove conservation.

However, research on gendered approaches to natural resource conservation in general suggests that there would be a connection between a gendered approach to mangrove conservation and improved conservation outcomes. For example, Agarwal's (2010) empirical research shows the connection between a gendered approach to conservation and improved forest health. Furthermore, international policies such as the 1992 Rio Declaration, the 1992 United Nations Convention on Biological Diversity, and the 2002 Plan of Implementation from the

World Summit on Sustainable Development, all recognize the connection between gender and natural resource management (Ogra, 2011).Vernooy & Fajber (2006) explain the connection demonstrated by Agarwal (2010) and noted in many international policy statements this way: “Notions of gender...class, caste, ethnicity, and age are integral to understanding the social relations and decision-making processes concerning access to, and use and management of natural resources.” Gender relations inform how natural resources are valued and conserved and must be considered if effective management is to take place (Vernooy & Fajber, 2006).

Considering this wide recognition of the link between gender and conservation, empirical evidence in the specific context of mangrove conservation would be extremely beneficial. Showing a connection between a gendered approach to conservation and improved mangrove conservation outcomes would encourage further research and inspire the integration of a gendered perspective into mangrove conservation and management strategies. Empirical evidence of this nature would spark interest in gendered analysis which has, thus far, been largely overlooked. With more research and greater efforts to implement gendered analysis, mangrove conservation strategies and mangrove ecosystem health are likely to improve.

Conclusion

Ultimately, after reviewing relevant literature, it appears that while there is some progress toward integrating gender into mangrove conservation, more work is necessary. Because gender has only recently become a part of the discourse on mangrove conservation, there are few studies related to this topic. There are even fewer attempts to practically apply research by implementing gender mainstreaming in mangrove conservation management. There is a need for more research on gender and mangrove conservation that demonstrates the importance of using a gendered

approach to mangrove resource management and illustrates the positive benefits of gender mainstreaming in mangrove conservation in terms of equity and ecosystem health.

When plans for gender mainstreaming of mangrove conservation efforts are suggested, it seems that there is confusion about which approaches are most successful. There is disconnect between the GED perspective and proposed strategies that often adopt a WID perspective or a combination of WID and GED outlooks. Those strategies that have been employed are rarely evaluated to test their success in terms of improved mangrove ecosystem health or gender equity indicators.

A common form of evaluation for mangrove conservation projects that measures ecosystem health and gender equity is necessary. This system would help to reduce confusion about how to practically apply a GED framework and how to mainstream gender in mangrove conservation management. It is important to recognize that a strategy that works in one area, may not work in another. Using a common framework for evaluation rather than implementation will help to determine which strategies are best in a particular context. It will allow the development of unique and effective methods for addressing gendered power dynamics and creating equitable conservation initiatives in specific regions or communities.

A common framework for evaluation and continued research is particularly important in regions where studies on gender and mangrove conservation are lacking such as South America, North and Central America and the Caribbean, and where studies on gender and mangrove conservation are absent, such as West and Central Africa, The Middle East, East Asia, Australia and New Zealand, and the Pacific Islands. Ideally, if gender mainstreaming in mangrove conservation is evaluated and shown to be successful in one area, it will spread to other areas

where mangroves are threatened and will inspire gender mainstreaming in regions where a gendered approach to mangrove conservation has previously been overlooked.

With continued research and evaluation of gender as it relates to mangrove conservation, gender issues can be further incorporated into the discourse on mangrove resource management and progress can be made toward designing, implementing, and evaluating effective gender mainstreaming of mangrove conservation worldwide. In order to save the world's mangroves from degradation and disappearance, we must search for new and more successful approaches to conservation and management. We must seriously consider and use a gendered approach to mangrove conservation in order to promote the type of innovative, sustainable, and equitable conservation systems vital for the success of future mangrove protection and management.

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Appendix:

Coding Guide-

*If the answer is yes, then the article is coded using that question number

(C1) Category #1— How often is gender mentioned in literature on mangrove conservation?

(S1) Section 1: Uses gendered perspective to look at coastal resource management

Q1: Does the article mention gender?

Q2: How often does the article mention gender? L (low-only a brief mention) M

(medium-gender is not a central part of the argument, but is still discussed in some detail)

H (high- integrated throughout paper)

- (S2) Section 2: Has an academic understanding of gender as it relates to coastal resource management
- Q1: If the article mentions gender, does it explain why it is analyzing gender?
 - Q2: Is the article academic in nature?
- (S3) Section 3: Looks specifically at gender as it relates to mangrove conservation
- Q1: Does the article talk about mangroves specifically?
 - Q2: Does the article talk about services provided by mangrove ecosystems or communities reliant on mangroves?
 - Q3: Does the article specifically link gender to mangrove conservation?
 - Q4: Is gender subsumed under other categories (ie; community organization)?
- (C2) Category #2—stereotypes about gender/portrayal of gender roles: How do those articles that mention gender portray men and women and the differences between them?
- Q1: Does the article assume that women are naturally more protective toward the environment?
 - Q2: Does the article focus on differences in gender roles or resource use?
 - Q3: Does the article focus on women mainly as victims of environmental issues?
 - Q4: Does the article consider women to be agents in dealing with environmental issues?
 - Q5: Does it discuss the idea that women’s work is undervalued?
 - Q6: Does the article recognize that differences in roles and patterns of resource use influence male/female perspectives on resource management?
 - Q7: Does the article portray men as those who destroy the environment?
 - Q8: Does the article recognize the need to account for power differences when implementing community-based natural resource management or collaborative management approaches to conservation?
 - Q9: Does the article see gender as a part of power differences?
 - Q10: Does the article mention that women are marginalized?
- (C3) Category #3—Strategies for improving mangrove conservation initiatives/success of these strategies
- (S1) Section 1: The article offers a strategy to incorporate gender into mangrove conservation
- Q1: Does it talk about the ways to implement gender analysis?
 - Q1.5: Does it talk about ways to encourage gender equity?
 - Q2: Does the article offer a strategy for dealing with power differences between genders?
 - Q3: Does the article seem to look at gender in terms of how many women are included in projects?
 - Q4: Is its strategy vague (ie; need to include voiceless women)?
- (S2) Section 2: Current Strategy WED vs. GED
- Q1: Does the article implement, evaluate, or propose a WED perspective, arguing that women should be the focus?
 - Q2: Does it implement, evaluate, or propose GED perspective?
 - Q3: Does the article talk about gender in terms of reproductive health/population reduction?
 - Q4: Does it offer a solution based on the assumption that men are destructive or women are protective of mangroves?
- (S3) Section 3: Article has a method to evaluate success of strategies
- Q1: Does the article offer a way of evaluating the success or failure of its strategies/other strategies?

Q2: Does it use empirical data to show a direct correlation between inclusion of women in conservation management and the improvement of mangrove conservation efforts?