Biodiversity Prioritisation and Gender

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IEG Working Paper No. 324

2013

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सत्यमेव परमो धर्मः IEG Working Paper No. 324

2013

ACKNOWLEDGEMENTS

The initial version of this paper was presented at the *II International Conference on Gender Relations in Developing Societies: A 21st Century Perspective* held at Maharaja Agrasen College, New Delhi on 19 March 2013. A subsequent version was presented at a seminar at the Institute of Economic Growth, New Delhi on 18 April 2013. I thank the participants in both sessions for their comments and suggestions.

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ABSTRACT

Because the financial commitments to preserve biodiversity fall short of what is needed, the elements of biodiversity must be prioritised so that limited funds can be used most effectively. The key issue I address here is the weaknesses of such prioritisation mechanisms with respect to gender concerns. I begin by defining biodiversity and how species are prioritised for preservation. Next, I utilise theories from the existing literature to analyse how each component of the prioritisation is likely biased when ignoring the linkages between biodiversity, gender, and economic development. Finally, I conclude by demonstrating that the net impacts of those biases could lead to either a deflation or an inflation of the ranking for species valued by women and by discussing the implications of that complexity.

Keywords: Biodiversity, Noah's Ark, gender, women, development

JEL codes: Q57, J16, O13

1. INTRODUCTION

Biodiversity is declining and will continue to decline through this century (Pereira et al. 2010). Governments worldwide are concerned enough about that decline to increase their funding for biodiversity protection by over $10 billion annually (Secretariat of the Convention on Biodiversity 20 October 2012). But those pledges pale in comparison to the annual $76 billion that McCarthy et al. (2012) concluded was necessary. Weitzman (1998) brought the Noah's Ark metaphor to this policy challenge. This metaphor is based upon the Abrahamic religions' belief (*Torah* Book of Bereshit, *Bible* Book of Genesis, and *Qu'ran* Surah 11) that God destroyed the world by a flood except for the people, animals, and plants Noah saved in the ark.[1] So, the goal of the policy makers is to create a prioritisation scheme that guides a Noah-like policy maker in deciding which species to save.

Naturally, any prioritisation scheme rests upon the valuation of various species. Concern over how to value biodiversity (although perhaps not by that name) has had a long tradition in economics. One hundred years ago, Gray (1913: 518–19) asked: 'What is the criterion of social value?' Thus, he identified one of the core issues in conservation economics. Yet, economists have been concerned mostly with trying to integrate ecological aspects into economic models[2] and with the various questions related to intergenerational equity[3], not gender issues.

There is a history of economic analysis treating women as 'external' to the market in the same way that environmental issues are treated as externalities, which means that the corrections for gender need to simply replicate the corrections for environmental issues. This correction centres on creating Pigouvian taxes (or subsidies) to add to (or subtract from) market prices (Buchanan & Stubblebine 1962). Yet, these traditional neoclassical responses to market failures may make valuation failures worse as their estimates are based upon the assumptions that income distributions and property rights assignments are appropriate (Jakobsson & Dragun 2001). Further, such taxes/subsidies are appropriate only for the marginal changes for which they are designed and not for the substantial and broad corrections that widespread externalisation of women would imply.

Much research suggests that there are no gender issues related to environmental concerns, let alone related to biodiversity. This might explain the apparent lack of concern

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[1] Other religious traditions have similar flood stories, such as Matsya's (an avatar of the Hindu deity Vishnu) saving of Manu (the first man) as told in the *Śataphat Brāhmana* (I.8.I).

[2] See Van der Ploeg, Braat, & Van Lierop 1987; Gowdy 1993; Norgaard 1994; Eppink & van den Bergh 2007.

[3] See Tisdell's (2011) review.

for gender issues even if women were being properly internalised into market analyses of biodiversity. The gender influence on the willingness to incur costs to protect the environment is weak and inconsistent across 22 countries (Kemmelmeier, Król, & Kim 2002). Gelissen (2007) found no gender differences across 50 countries in peoples' willingness to make sacrifices to improve environmental quality. Freemeyer & Johnson (2010) studied 26 countries to determine whether women were environmentally more motivated than men, with mixed results. Givens and Jorgens (2011) demonstrated that women across 38 nations were more likely than men to express concern for air pollution. In a study of 27 countries, Marquart-Pyatt (2012a) showed that men and women were equally willing to incur costs for environmental protection although women were more aware than men of environmental threats and placed greater importance on addressing environmental issues. In a narrower study, of 16 countries, Marquart-Pyatt (2012b) found men and women equally environmentally active in 12 of the 16 countries and that the pooled effect was only slightly positive.

On close scrutiny, though, the data sets commonly analysed are biased towards European and North American countries. Several of these studies used the International Social Survey Programme (Kemmelmeier, Król, & Kim 2002; Freemeyer and Johnson 2010; Marquart-Pyatt SSR 2012a; Marquart-Pyatt 2012b); Gelissen (2007) and Givens & Jorgens (2011) used the World Values Survey. The countries studied are irrelevant to biodiversity. Barrett, Travis, & Dasgpta (2011: 13907) give a qualitative assessment of that conclusion: 'The persistence of extreme poverty and continued rapid loss of biodiversity appear intimately related. Extreme poverty and biodiversity hotspots are geographically coincident, concentrated in rural areas where livelihoods depend disproportionately on natural capital embodied in forests, rangelands, soils, water, and wildlife.'

By explicitly linking biodiversity preservation with gender dimensions and development goals, Rajvanshi & Arora (2010) draw attention to the common aspects of these three concerns; these linkages, developed further below, motivate this paper. My concern here is that Noah's prioritisation methodologies ignore those gender issues and so lead to distorted rankings. In particular, I show that the biases have complicated impacts upon rankings of species that women would tend to value highly. The complexity of the linkages between biodiversity, gender, and development leads to these complicated impacts.

In the next section (Section 2), I define biodiversity and develop one model of how different species are prioritised. In Section 3, I use theories from the gender–biodiversity–development literature to show how the components of that model consistently undervalue species valued by women in developing societies. I offer concluding comments in the final section (Section 4).

2. DEFINING AND PRIORITISING BIODIVERSITY

E.O. Wilson's (1996: 1) popular definition of biodiversity is a good starting point: 'Biodiversity is defined as all hereditarily based variation at all levels of organisation, from the genes within a single local population or species, to the species composing all or part of a local community, and finally to the communities themselves that compose the living parts of the multifarious ecosystems of the world.' Expanding upon that definition Naeem, Duffy, & Zavaleta (2012) describe seven different ways that organisms might be diverse: taxonomic diversity, phylogentic diversity, genetic diversity, functional diversity, spatial or temporal diversity, interaction diversity, and landscape diversity. Cardinale et al. (2012: 60) listed six consensus statements about biodiversity that imply what it does:

1. Biodiversity loss reduces the efficiency by which ecological communities capture biologically essential resources, produce biomass, decompose, and recycle biologically essential nutrients.
2. Biodiversity increases the stability of ecosystem functions through time.
3. The impacts of biodiversity on any single ecosystem process is nonlinear and saturating (total benefits exhibit diminishing marginal returns).
4. Diverse communities are more productive because they contain key species that have a large influence on productivity, and differences in functional traits among organisms increase total resource capture.
5. Loss of diversity across trophic levels has the potential to influence ecosystem functions even more strongly than diversity loss within trophic levels.
6. Functional traits of organisms have large impacts on the magnitude of ecosystem functions, which give rise to wide range of plausible impacts of extinction on ecosystem function.

Therefore, biodiversity is part of our stock of natural capital (Costanza & Daly 1992) in the sense that nature created it (hence 'natural') and nature and humans use it to produce goods and services we value (a form of 'capital'). Flows from the stock of biodiversity serve key functions within our agricultural system (e.g., Altieri 1999; Drucker, Gomez, & Anderson 2001) and are the raw material for bioprospecting for pharmaceuticals (e.g., Simpson, Sedjo, & Reid 1996; Rausser & Small 2000; Craft & Simpson 2001). Since Krutilla (1967), economists have measured the values from biodiversity beyond such use values and option values (potential use values in the future), including the non-use values described in Smith (1996) and the values of such ecosystem services as the value of tropical forests to adjacent coffee plantations (Ricketts et al. 2004) and the value of insects (Losey & Vaughn 2006).

Also, analysts acknowledge that the stock of biodiversity provides flows of valuable social, cultural, and religious services, such as those discussed by Thompson & Starzomski (2007); Bryan et al. (2011); and Daniel et al. (2012).

Weitzman (1998) developed a ranking equation for species that captured some of the elements mentioned above to prioritise their preservation by a Noah-like policy maker. Following his example but extending his notation, define species *i* as living on (or in) hectare *l* being affected by biodiversity preservation policy *p* that is being compared to the status quo of policy 0.[4] In Equation (1) below, the rank of that species ($R_{i,lp}$) follows from three components. The first component ($\Delta V_{i,l,p}$) represents the change in the value to society because of the policy; naturally, much discussion in the literature has focused on this term. The term $\Delta P_{i,l,p}$ represents the change in the probability of the survival of that species because of that costly action. Its inclusion in the ranking allows for trade-offs between the benefits of a policy and likelihood of the policy being successful (Weitzman 1992), which Weitzman (1993) demonstrates with an intriguing pedagogical example involving the crane family (*Gruiformes gruidae*). The final term is the policy's cost ($C_{i,l,p}$).

$$R_{i,l,p} = \left(\Delta V_{i,l,p}\right)\frac{\Delta P_{i,l,p}}{C_{i,l,p}} \tag{1}$$

Noah will be able to utilise this ranking process in the same way that he would any consumption good as it simply follows the ubiquitous equimarginal rule. For the rule to work, the benefits from consuming one more good must increase with diminishing returns. Therefore, it is important that Béné and Doyen (2008) concluded that as biodiversity increases, the ecological and economic jointly increase with diminishing returns. That conclusion allows Noah to load the ark by choosing the species preservation policy with the highest ranking and continue the loading by always choosing the policy with the next highest ratio so that when the ark is filled, the value of the ranking will be equal across all the marginal species preservation policies. If Noah chooses ark size in consistency with the strong sustainability criterion, the amount of biodiversity allowed into the ark would allow society to develop in a socially optimal manner (Martin 2013). If the budget allows for a smaller ark, at least Noah will have saved the most valuable species and habitats.

Wardle et al. (2011) stress that biodiversity changes are not just about species losses; rather, the loss of some species in an area can lead to complex ecological changes that in turn drive gains for some species and losses for others. So, Equation (2) augments Equation (1) to account for that complexity. The first right-hand side term simply repeats Equation (1). The second right-hand side term adds the impacts to other species on the same hectare. The

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[4] The development of this model draws from the analysis in Martin (2013), where this microeconomic and an accompanying macroeconomic model are developed and demonstrated.

impacts to all species (including the focal species i) elsewhere is represented by the final right-hand side term.

$$R_{i,l,p} = \frac{\left(\Delta V_{i,l,p}\right)\left(\Delta P_{i,l,p}\right)}{C_{i,l,p}} + \frac{\sum_{j \neq i}\left(\Delta V_{j,l,p}\right)\left(\Delta P_{j,l,p}\right)}{C_{i,l,p}} + \frac{\sum_{h \neq l}\sum_{j}\left(\Delta V_{j,h,p}\right)\left(\Delta P_{j,h,p}\right)}{C_{i,l,p}} \tag{2}$$

There is substantial discussion about how to measure the change in the value to society ($\Delta V_{i,l,p}$) because of the policy. One type of study focuses on the exclusive use of ecological indicators as measures of value; Brooks et al. (2006) reviewed several of them. Some well known examples are a hotspot analysis for the Indo-Pacific region (Dinerstein & Wikramanayake 1993); an identification of international ecological hotspots (Myers et al. 2000); and a ranking of all the counties in the conterminous US by the number of saved species per land cost (Withey et al. 2012). At the other end of the hypothetical spectrum are studies that focus solely on the economic benefits of the species; the classic example is Weitzman's (1998) analysis that utilised the current use value and the option value of each species.

Fortunately, Arponen's (2012) analysis suggests one does not need to utilise exclusively either the economic values or the ecological values of a species preservation policy. He concluded that the product of the two values is the appropriate measure of the policy's affect ($\Delta V_{i,l,p}$) as described in Equation (3), where TEV represents total economic value and M represents ecological value (these terms are defined in the following paragraph).[5] This multiplication allows a large change in one to measure to offset a small change in the other.

$$\Delta V_{i,l,p} = \left(TEV_{i,l,p} - TEV_{i,l,0}\right)\left(M_{i,l,p} - M_{i,l,0}\right) \tag{3}$$

Equation (4) follows the example of Walsh, Loomis, & Gillman (1984) in defining total economic value ($TEV_{i,l,p}$). It starts with the harvest value and option value of a species, which reflect the traditional concepts of current and potential future use values of a resource. It then adds the use of biodiversity service flows in situ, the existence value (which measures the value placed on the knowledge that these flows exist even if one will never use them), and the bequest value (which measures the satisfaction gained from knowing that one

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[5] Gray (1913) introduced temporal dynamics into the economics of natural resource use, arguing that one of the most important social conditions for creating the proper motives for resource conservation was a low interest rate. Sixty years later, Clark (1973) more famously related the growth rate of a species to the rate of return from other economic activities. Further, Duffy (2009) and Reich et al. (2012) showed that the concept of evaluating ecological changes over time is also critically important. So, while the notation here is not explicit in this matter, the economic and ecological values described here will be in present value terms, with the understanding that the mechanism for such discounting is best discussed elsewhere.

endows future generations with those flows) to the use and options values. The specific categorisation of any one flow of biodiversity services is irrelevant—many service flows from biodiversity mentioned earlier could be listed in several of these categories—as long as it is understood that the intent is to include the values all of biodiversity's flows in this measure.

$$TEV_{i,l,p} = \left[Harvest_{i,l,p} + Option_{i,l,p} + InSitu_{i,l,p} + Existence_{i,l,p} + Bequest_{i,l,p}\right] \tag{4}$$

As seen by E.O. Wilson's (1996: 1) definition of biodiversity and Naeem, Duffy, & Zavaleta's (2012) and Cardinale et al.'s (2012) conclusions discussed at the beginning of this section, defining the ecological value of a species' contribution to biodiversity is a complex matter. Recently, Perry (2010) used Equation (5) to quantify these ideas. Here, the ecological importance ($M_{i,l,p}$) of a species increases as the number of species in the ith species function group ($F_{i,l,p}$) decreases[6] and as the number of species affected by the ith species function ($N_{i,l,p}$) increases.

$$M_{i,l,p} = \frac{\sqrt{N_{i,l,p}}}{F_{i,l,p}} \tag{5}$$

Equation (6) results from inserting Equation (3) into Equation (2). It is implicit that Equations (4) and (5) would be used to measure the economic and ecological values of a species, respectively.

$$\begin{aligned} R_{i,l,p} = {} & \frac{\left(TEV_{i,l,p} - TEV_{i,l,0}\right)\left(M_{i,l,p} - M_{i,l,0}\right)\left(P_{i,l,p} - P_{i,l,0}\right)}{C_{i,l,p}} \\ & + \frac{\sum_{j \neq i}\left(TEV_{j,l,p} - TEV_{j,l,0}\right)\left(M_{j,l,p} - M_{j,l,0}\right)\left(P_{j,l,p} - P_{j,l,0}\right)}{C_{i,l,p}} \\ & + \frac{\sum_{h \neq l}\sum_{j}\left(TEV_{j,h,p} - TEV_{j,h,0}\right)\left(M_{j,h,p} - M_{j,h,0}\right)\left(P_{j,h,p} - P_{j,h,0}\right)}{C_{i,l,p}} \end{aligned} \tag{6}$$

3. GENDER AND BIODIVERSITY PRIORITISATION

As Hawkins et al. (2011: 243) state: *[G]ender matters all the way through* the body, household, home, habitat, city, region, nation, and globe (emphasis in the original). In particular, the complexity of gender-based analysis of biodiversity has been recognised for some time; see Rocheleau (1995) for example. As Pfeiffer and Butz (2005) point out, a large part of this complexity arises because of the complexity of the gender differentiation of the various roles in agriculture and other aspects related to biodiversity. Vazquez-Garcia (2008)

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[6] A keystone species has $F_{i,l,p}=1$.

adds another layer of complexity by emphasising that different cultural groups within the same region might differentiate the same roles differently between women and men. So, one cannot automatically assume that women and men will behave in certain ways with respect to biodiversity; and the theories relating gender to biodiversity must be very general to accommodate the wide range of possible motivations and behaviours.

The fundamental question addressed in this analysis is: how is the ranking of species i as given in Equation (6) distorted when gender considerations are ignored? It is a bit easier to answer that question after simplifying Equation (6), now that its components are detailed above. Equation (7) shows that the ranking of species i because of a specific policy (R_i) is a combination of four components summed across all species j: the change in the total economic values of species (ΔTEV_j), the change in the ecological importance species (ΔM_j), the change in the probability that species will survive (ΔP_j), and the cost of that policy (C_i). Each of those four components will be addressed individually.

$$R_i = \sum_j \frac{(\Delta TEV_j)(\Delta M_j)(\Delta P_j)}{C_i} \tag{7}$$

The influence of gender on the first component, the total economic values of species (ΔTEV_j), can be analysed from the context of the gender-differentiated difference between the public and the private spheres of activity. Tindall et al.'s (2003) framing of this concept developed from the observation that women in British Columbia were significantly more engaged in environmentally friendly behaviours than men although there was no gender difference in environmental activism. Hunter, Hatch, & Johnson (2004) used the 1993 International Social Survey to demonstrate that women engage in more private environmental behaviours than men do. Xiao and Hong's (2010) extended this framework to developing countries by applying it to analyse gender-differentiated concerns for and differences in environmental behaviours in China.

O'Shaughnessy and Kennedy (2010) were also motivated by results that showed that women express more concern for environmental issues than men but demonstrate less activism as typically defined. In response, they developed a concept similar to the public–private spheres differentiation that they referred to as relational activism, which (1) conceives of the individual as a member of a community, (2) uses daily practices to change norms, and (3) uses the private sphere for public purposes.

The common core to these two theories is that when gender constrains time and leads to differentiated social networks, the expression of the environment's value will take place in different venues (more private outlets) for women than for men. Women will actively value biodiversity, but in contrast to men will tend to demonstrate those high values as part of their daily lives through their individual actions or as part of their social networks. Crucially, the use of phrases like 'private sphere' and 'daily practices' signal that these actions take place outside of venues that capture their market values. Thus, the economic values that women derive from biodiversity will not be observed by analysts, causing Noah to underestimate the species involved. For example, in their meta-analyses of the determinants of the economic value of wetlands, Brander et al. (2006) and Ghermandi et al. (2010) conclude that their value is reduced when the functions of serving as firewood sources and as places for the harvesting of natural materials are assessed. Women in developing societies often perform these tasks as part of their private spheres outside of the market, so it is likely that those lower wetland values do not include the value that women place on the wetlands.

The bias in the change in the ecological importance species (ΔM_j) can be analysed using one of the most common themes in the literature: the gendered differentiated roles in agricultural in developing societies. Such differentiation has been reported broadly, including in South Asia by Agarwal (2000), Upadhyay (2005), Narayanan and Kumar (2007), Allendorf & Allendorf (2012); in West Asia by Abdelali-Martini et al. (2008); in Mexico by Cabrera et al. (2001) and Chambers and Momen (2007); and in Africa by Mackenzie (2003) and Howard & Nabangoa (2007). These differentiated roles often are associated with gender-differentiated access to and division of resources and with gender-differentiated decision making in rural communities (Agarwal 2000; Allendorf & Allendorf 2012).

The ecological value of species is something that often takes repeated observations over lengths of time to observe—the type of observation that comes naturally for many women in developing societies as go about their tasks (often with other women). So, it is fair to say that rural women in developing countries have different perspectives on what species are important and why they are important than men have because women's perspectives are based on different knowledge sets than men's. In particular, the concern that the differentiated agricultural roles theory raises in concert with the private-public sphere distinction and relational activism theories is that women's knowledge sets will be outside market economies and so will not be incorporated into the scientific understanding of the value of species. As with the total economic value of the species, this omission in the assessment of the ecological value will reduce the ranking of species observed by women.

The economic and the ecological values of species are weighted by the change in the probability that species will survive because of the policy (ΔP_j). As Agarwal (2009) emphasised, it can be difficult for many (often interrelated) reasons for women to participate effectively in programmes that relate to biodiversity management. Yet, when they do participate in meaningful ways, the probability that the programmes will be effective increases, perhaps because women's social networks operate differently than men's networks do (Agarwal 2000). As one example, Pillai and Suchinatha (2006) discussed how women organise self help groups to help manage the Periyar Tiger Reserve, including voluntary patrols of the reserve, to maintain its ecological conditions better. As another example, Padmanabhan (2008) showed how the collective action of a tribal community was more effective than a government-sanctioned register in protecting agro-biodiversity in Wayanad, Kerala, because the collective action built upon women's emphasis on reputation, trust, and reciprocity.

More generally, Westermann et al. (2005) looked at natural resource management groups in Asia, Africa, and South America. They concluded that women tended to enhance the collaboration, conflict management ability, and group maturity of natural resource management groups. The roles women can and do play in natural resource management are reduced by society; to the extent this is ignored, the probability that biodiversity policies will be successful is reduced (Agarwal 2000). Noah's rankings will undervalue species that women could (and likely already do) manage effectively as part of private activities in their differentiated agricultural roles.

It is likely that the denominator term, the cost of a policy to protect biodiversity (C_i), is deflated by two gender biases. The first bias arises because, as noted earlier, biodiversity tends to be where poorer people live. Fisher & Christopher (2007) developed some empirical evidence for that assessment by using Conservation International's 'hotspot' maps in conjunction with political maps to ascertain the overlap between poverty and biodiversity. Of the 91 countries with Conservation International's 'hotspots' for which there were data, 25 had 50 per cent or more of the population living below the poverty level. Further, the six hotspots that are the most imperilled by socioeconomic conditions constitute 64 per cent of the land area in all the 34 hotspots.[7]

The costs of biodiversity protection fall upon relatively poor people because such protection requires restricting the use of resources and the primary users of those resources are poor people (Adams et al. 2004; Chapin 2004; Ferraro, Hanauer, & Sims 2011; and Turner et al. 2012). Finally, in those same places, there are often income disparities between women and men in those countries (see, for example, Alvarez-Castillo & Feinholz 2006). It is important to stress that measures of economic costs typically assume the income distributions as given and limit economic costs to the value of people's income. So, the first bias in assessing the costs of biodiversity protection policies arises because the affected women's low incomes limit the economic measure of the opportunity costs that the policies impose on them.

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[7] Calculated using Fisher and Christopher's (2007) Figure 1, Table 3, and the on-line Supplemental Data, Table 1A

The second bias arises because the poor apparently behave differently than other people do. Shah, Mullainathan, & Shafir (2012) show that poor people tend to focus on some problems to the neglect of others, which leads to a tendency to borrow more and save less than other people do. Depriving poor women of the resources they typically use as part of a biodiversity protection policy risks exacerbating this tendency and places these women's households under greater financial risk, especially if their income falls. Since the costs of biodiversity protection policies do not measure such risks, those policy costs will be understated for women whom the policies restrict from using natural resources.

4. CONCLUDING COMMENTS

At this point, it is important to remember the earlier statements about the primacy of considering gender all the way through the analysis (Hawkins et al. 2011) and the complexity of the biodiversity–gender–development linkages (Rocheleau 1995; Pfeiffer & Butz 2005; Rajvanshi & Arora 2010), which leads to complicated conclusions when one considers all the components of the ranking of biodiversity priorities. Equation (8), which summarises the discussion from Section 3, highlights that complexity.

$$\text{Direction of Biases}: \sum_j \frac{\left(\overset{\downarrow}{\Delta TEV_j}\right)\left(\overset{\downarrow}{\Delta M_j}\right)\left(\overset{\downarrow}{\Delta P_j}\right)}{\underset{\downarrow}{C_i}} = \overset{?}{R_i} \qquad (8)$$

By ignoring gender concerns, analysts will likely underestimate each of the three numerator terms in Noah's biodiversity prioritisation methodology for species valued by women: total economic value, ecological importance, and the probability of policy success. It is important that each term be analysed separately as each is potentially biased against women for different reasons. At the risk of over-generalising, one might state that gender-differentiated roles and time constraints lead women to express the value of biodiversity in ways that markets typically do not measure, and that women could contribute to biodiversity protection programmes in ways that are often under-appreciated. These sets of biases imply that biodiversity protection policies are not imposed frequently enough to protect the interests of rural women in developing countries.

However, as Equation (8) also points out, the costs of biodiversity protection policies are typically measured in ways that underestimate the impacts on women. Depriving women, particularly rural women in developing societies, of the resources that they use (in ways that are underestimated by economic analysts) imposes costs upon them and their households that are higher than estimated. There is also an increased sense of financial risk due to that deprivation. This underestimation bias would imply that biodiversity protection policies would be imposed too frequently and too restrictively upon rural women in developing countries.

So, in conclusion, one cannot simply state that Noah or his economic analysts will always deflate or always inflate the ranking of species valued by women. Biodiversity protection has a complex relationship with gender and with economic development. For each case of biodiversity protection, gender must be analysed with respect to all four of the prioritisation components, as each component likely would otherwise be biased in various degrees and the directions of the biases can be contradictory. Only through careful analysis will the direction of bias be confirmed for each specific case.

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