



## Research paper

# What can forest values tell us about human well-being? Insights from two biosphere reserves in Madagascar



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## HIGHLIGHTS

- Forest value perceptions provide insights into local natural resource and land use.
- Human capabilities describe the relationship between forest values and well-being.
- Instrumental and intrinsic values reveal the need for nature conservation.
- Human capabilities provide orientation in sustainable biosphere reserve management.

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## ABSTRACT

The article discusses the relationship between conceptions of forest values among local people in Madagascar and human capabilities. According to Amartya Sen's capability approach, capabilities include both the means of maintaining a livelihood and intangible elements that are necessary to achieve overall well-being. In a qualitative case study in Madagascar's Mananara-Nord and Sahamalaza Biosphere Reserves, we investigated local peoples' conceptions of forest values. Our analysis revealed that forest-value categories fall under a range of ecosystem services and are therefore clustered accordingly. The distinction between instrumental and intrinsic values indicates the broad spectrum on which local people conceive the benefits they derive from the forest. This article discusses the interconnection between instrumental and intrinsic forms of forest value and the important role played by intrinsic values in promoting well-being and conservation. It also addresses the nature of the capabilities that are based on the perceived forest values. Two conclusions are drawn. First, local population's views on valuable natural elements serve to indicate what they consider important for the achievement of well-being. Second, capabilities based on such natural values are vital for their collective sense of sustainable development and need to be given greater consideration in sustainable natural resource and land management.

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## 1. Introduction

Nature serves as basis for society and the economy insofar as it provides both natural resources to satisfy human needs and life support functions that are essential to human well-being. In order to foster sustainable living conditions it is necessary to find ways to maintain the supportive functioning of ecosystems. Ensuring sustainable living conditions implies the management of people's livelihoods so as to foster the capability of others, and especially future generations, to live sustainably (Brundtland, 1987; MEA, 2005).

In Madagascar, an island with extraordinary natural vitality, many protected areas have been established in order to sustain the conditions necessary for local people's way of life. The well-being of rural communities still depends heavily on their use of natural resources. They have learnt how to maintain soil fertility, where to find natural resources that can be used as building materials, and which plants can be exploited for their medicinal properties (Byron & Arnold, 1999). The establishment of protected areas is thus clearly of concern for the rural populations of Madagascar. One complicating factor is that funding providers and policy makers tend to have a different interpretation of the benefits provided by ecosystems than rural Malagasy people (Scales, 2011). Policy makers, for example, focus on protecting forests in order to reduce greenhouse gas emissions, whereas local people see the forest as being essential for their dietary requirements and their health, and as a resting place for their ancestors. Thus, alongside the assessment and valuation

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of the global ecosystem-services provided by the forests there is a need for the cultural framing of the relations between ecosystem functioning and communal senses of well-being.

On the basis of two case studies in Madagascar this article explores the links between nature, human well-being and development relevant for sustainable land management. It raises two questions. Which particular values do rural Malagasy people associate with forests? And to what extent are these values conducive to furthering local people's well-being? In the examination which follows interpretations of ecosystem services natural values are joined to Amartya Sen's capability approach. We first give a description of the case study sites (two biosphere reserves in Madagascar) and the methodologies applied, and then offer an analysis of forest values, which are defined here as cultural benefits for local people. By establishing a link between forest values and human well-being, we indicate the importance of natural values and thus of the capabilities with which they are associated. We also discuss their consideration in land management, and propose ideas for new perspectives in sustainable land management.

## 2. Conceptual background

### 2.1. Ecosystem services and natural values: The link between nature and well-being

Daily et al. (1997) define ecosystem services as “conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life” (Daily et al., 1997: 3). Daily et al. (1997) thereby draw a link between ecosystem services (ESS) and human well-being. On the basis of this connection, the Millennium Ecosystem Assessment (MEA) was established in order to collect information capable (a) of deepening understanding of the relationship and links between ecosystems and human well-being, and (b) of demonstrating the potential contributions ecosystems can make to poverty reduction and enhancing well-being. The MEA defined human well-being as consisting of “basic material needs for a good life, the experience of freedom, health, personal security, and good social relations” (MEA, 2003b: 71). Two sets of factors are thus important for the achievement of human well-being: first, those which make it possible to maintain a livelihood and second, those which promote well-being. The MEA quantified the economic benefits of ESS and the anthropogenic threats posed to them. Forms of their non-economic value were also considered, notably their ecological, socio-cultural and inherent value based on ethical and cultural foundations (MEA, 2003a).

Generally speaking, human beings – whether individually or in groups – determine “what things are good, and how good they are” (Schroeder, 2008: 1st paragraph). These valuations can also be applied to the environment, not only insofar as the latter fulfils certain functions, but also insofar as it may be considered culturally meaningful and beautiful.

O'Neill, Holland, and Light (2008) take this distinction further. Attributes that are of *instrumental value* are those which are considered useful. If a natural object is used to achieve a predetermined end or to satisfy a need, either the object or the relation is of instrumental value. This category contains several of the provisioning ecosystem services such as timber and medicinal plants, and regulating services such as soil retention of floodwater. In this article, instrumental values are considered as being generally substitutable, i.e. if a particular good is not available, the need can be fulfilled by an equivalent (Chan, Satterfield, & Goldstein, 2012). This propensity is connected to a separatist view of human–nature relations.

Those elements of nature which have value in their own right are of *non-instrumental value* (Kupperman, 2005). Natural processes

can be described as means-end relations (such as the food chain); nevertheless, all means-end relations come to an end at the point at which an entity is seen to be “good-in-itself”, or intrinsically valuable. This idea is bound up with the idea of the interconnectedness of human–nature relations.

In the literature, different levels of non-instrumental natural value have been distinguished (Eser & Potthast, 1999). The category of *inherent moral value* refers to the moral standing of an entity considered in its own right. Where non-human entities are concerned, the important question is whether the entity at issue should be considered morally significant independently of any human valuation. In such cases, this will need to be decided through philosophical reasoning, rather than on the basis of given preferences. It was evident from the field interviews undertaken for this study, however, that this dimension had little cultural resonance amongst local people in the Malagasy biosphere reserves; it is therefore not considered here.

Another form of non-instrumental value, *eudaimonistic intrinsic value*, can be attributed to natural entities through associating biodiversity with human happiness/contentment and overall well-being. Here, the anthropocentric perspective is clearly significant. The objects or processes that are of eudaimonistic intrinsic value are ends in themselves for human beings, and are encountered by human beings through sensory perceptions, and feelings (Ott, 2003). Such qualities are perceived and recognised as being valuable in themselves. They are non-substitutable because they are unique. These values are neither absolute nor universally valid (as is the case with inherent moral values), but depend on the interconnections between human beings and the natural environment within a given context. Examples of this form of value include the sunset over the ocean or the appreciation of animals in their natural environment. Ecological values (attributed, for example, to species diversity and ecosystem integrity) and socio-cultural values (expressed, for example, through the designation of sacred places and the associated development of social rules) fall under this category (MEA, 2003a: 129).

Despite criticisms that the ecosystem services concept is anthropocentric, tends to promote commodification (McCauley, 2006), and is excessively normative (Schröter et al., 2014), this approach is still adopted here as means of conceptualising the perceived forest values. This article aims at a suitable inclusion of non-instrumental values in the sense of eudaimonistic intrinsic values (hereafter referred to as intrinsic values), in close integration with instrumental values. Ecosystems thus provide services to human beings that are of instrumental value insofar as they provide the means of maintaining a livelihood. On the other hand, ecosystems provide services that are of intrinsic value. These intrinsically valuable services foster other, often immaterial, dimensions of well-being (see Fig. 1).

Although for analytical purposes it can be useful to present instrumental and intrinsic values as discrete categories, subsequent

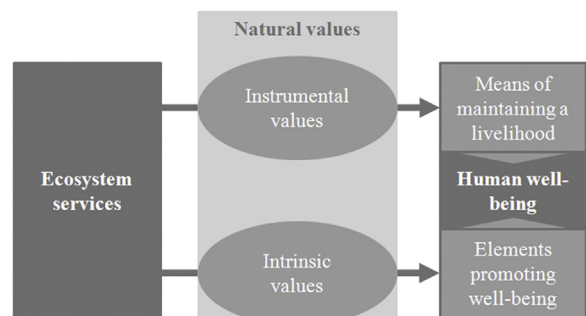


Fig. 1. Conceptual diagram indicating the links between nature and well-being.

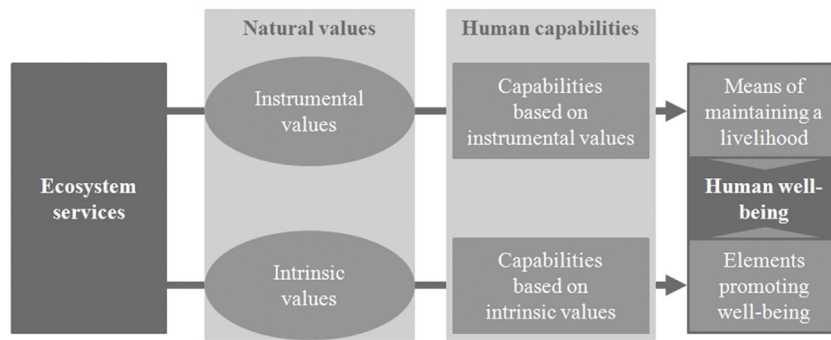


Fig. 2. Conceptual diagram indicating the links between nature, human capabilities, and well-being.

research findings indicate an important overlap between the two. Since they inform decision-making on resource use and maintenance and thereby contribute to defining human well-being at the local level, the approach adopted here involves identifying forest values from the perspective of engaged users. Here the forest is regarded as specific ecosystem which highlights the importance of natural values for local people in two biosphere reserves in Madagascar. The findings of the study can be used to inform biosphere reserve management strategies, in areas such as the maintenance of crucial access rights for local people, the establishment of preservation zones, and the creation of sustainable resource usage plans where necessary. It also has implications for the management of conservation from the perspective of local people. In order to better understand the human dimensions of human well-being, we now turn to the capability approach, which emphasises the link between human capabilities and well-being.

## 2.2. The capability approach: The link between human capabilities and well-being

Sen (1988) assumes that justice seeks to ensure that every human being can have a “good life”. Rawls (1999), for his part, focuses on the actual freedom to lead a good life, which is determined by a person’s holding of primary goods. He defines primary goods as “things which it is supposed a rational man wants whatever else he wants” (Rawls, 1999: 79). In emphasising the value of freedom, Sen (2009) believes, that being “free to determine what we want, what we value and ultimately what we decide to choose”, is both instrumentally and intrinsically valuable to human well-being (Sen, 2009: 232). It is instrumentally valuable because “what living standard we can enjoy must depend (at least partly) on how free we are to choose one bundle of commodities rather than another” (Sen, 1988: 270). Nevertheless, freedom should also be considered as an end in its own right, and in this respect it has a productive impact on human development. Sen (2009) suggests that “a serious departure from concentrating on the means of living to the actual opportunities of living” brings into view the non-material conditions of well-being (Sen, 2009: 233). Well-being thus becomes a matter of people’s freedom to live the kinds of lives that they have reason to value.

Simply being free to make a decision is not sufficient; it is also necessary to have the ability to put one’s choice into practice. Both of these aspects – freedom of choice and the capacity to act – thus constitute the ground of human capabilities, which are of significance beyond the purely economic sphere (Alexander, 2003). On the basis of this link between human capabilities and well-being, Sen (1997) asserts that fostering individuals’ capabilities will ultimately advance economic development and trigger social change. Education, for example, enables people to enter into more sophisticated discussions, gain new insights, and thus to develop ideas

and inventions for themselves. Although this constitutes a potentially successful approach to development, the prevailing practice in Madagascar (and other developing economies) is to stimulate development and compensate for conservation measures through the provision of material and alternative income sources (Agrawal & Redford, 2006).

In addition to individual capabilities, there are also collective capabilities which evolve through social interaction (Evans, 2002; Stewart, 2005). Here, the collective plays a central role in the development of well-being; the capacity to function together as a social entity can thus be regarded as an intrinsic human value (Ibrahim, 2006). Generally, what people value is subject to social and cultural influences (Sen, 2009).

The present article focuses on forest values which directly relate to people’s functionings (people’s beings and doings), such as being well-nourished or being in close spiritual proximity to ancestors and thereby reinforcing community continuity. These qualities form the basis of people’s capabilities, such as the ability to make use of the forest as a source of food, usable material, and medicine, and, in the case of certain parts of rural Madagascar, as site for the spiritual veneration of ancestors. On the basis of the idea that the possession of human capabilities is fundamental to the experience of well-being, in Fig. 2 we integrate such capabilities into the conceptual framework of Fig. 1. Here we differentiate between human capabilities based on instrumental values and those based on intrinsic values. Human capabilities based on instrumental values consist of the means of maintaining a livelihood, while capabilities based on intrinsic values serve to promote well-being (see Fig. 2).

The notion of capabilities based on natural values implies that there are environmental criteria of human well-being. One crucial feature of this new approach is its interweaving of instrumental and intrinsic value in its conception of cultural understanding and community continuity. This has important implications for sustainable biosphere reserve management in Madagascar, and for the attempt to establish a synergistic relation between conservation and development.

## 3. Methodology

### 3.1. Case study sites

Our empirical analyses are based on data from qualitative social science case studies in the Mananara-Nord, and the Sahamalaza Iles-Radama Biosphere Reserves, located, respectively, on the northeast coast and on the northwest coast of Madagascar (see Fig. 3).

The protected terrestrial areas contain large areas of primary forest, with lowland coastal rainforests (dense humid and littoral forest) in Mananara-Nord, and dry semi-deciduous forests

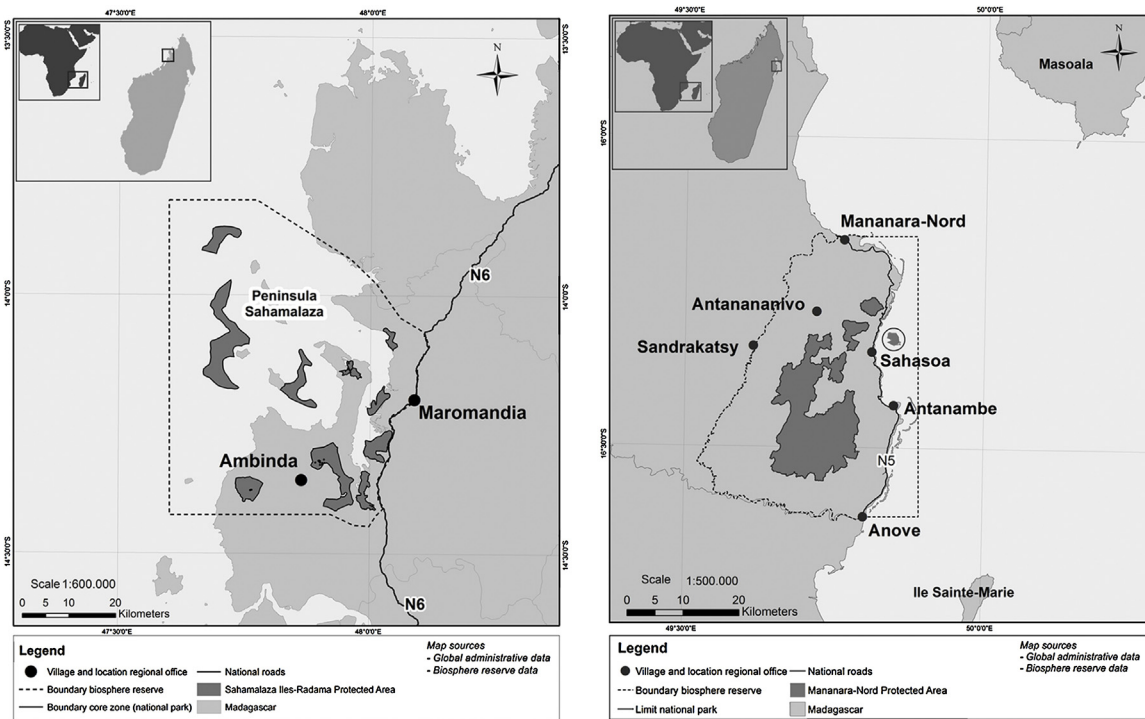


Fig. 3. Map of the Sahamalaza Iles-Radama (left) and Mananara-Nord (right) biosphere reserves.

alongside mangrove formations in Sahamalaza. The livelihoods of the majority of people living in these biosphere reserves (BRs) are based around subsistence farming (mainly rice, manioc, sugar cane and corn in both BRs) and livestock farming (more pronounced in Sahamalaza). Those who live in or near the forests collect or extract natural forest resources. While such resource extraction is relatively widespread, some areas remain unused, such as sites that are dedicated to the veneration of ancestors or other spirits. The exclusion of such sites from the usual practices of resource extraction is based on collective intrinsic values. Rules and regulations governing resource usage (principally verbal social agreements, called *dina*) determine how the forest resources are distributed. This is a cultural process which stipulates the quantities of resources that can be extracted and who is allowed to extract them (Andriamalala & Gardner, 2010). People who do not follow the rules expect to be punished. *Dina* are formulated by the members of a community. Their legitimacy is thus restricted to a given community (Henkels, 2001). Alongside *dina*, taboos (*fady*) provide another way of regulating natural resource and land usage. It is *fady*, for example, to make use of particular animals or plants or to enter certain forests, and cultivation is *fady* on certain days of the week. The interviewees confirmed that *fady* are effective as long as people respect their existence (Lambek, 1992). *Fady* are closely connected to the idea of the presence of ancestral spirits. These are said to exert an influence on resource access and usage (Bidaud & Ratriamoarivony, 2006; Schachenmann, 2006). It is customary to ask for the blessing of God and the ancestors when building a house or a grave, when setting out on long journeys, and at the commencement of agricultural work (SAVAIVO, 2003). When communal decisions need to be made regarding, for example, the rules of natural resource usage, the *chef de fokontany* (a representative of an administrative body in Madagascar's municipalities), the *tangalamena* (spiritual chief), and the village elders meet for a briefing before they call a general assembly. All community members have the right to speak. Decisions are reached by an open vote, and account is also taken of the judgment of the village elders (UNESCO, ANGAP, & DEC, 2001).

The Mananara-Nord BR was established in 1989 and was originally designed as an integrated conservation and development project, which provided local inhabitants with alternative income sources in order to reduce pressure on protected areas of forest. Contrary to the idea that engaging local people in development activities helps to convince them to conserve the forest, many people turned against the BR designation because they lost access to important agricultural areas. In the Sahamalaza BR (established in 2001), local people expressed their discontent by refusing to attend discussions on limits of the core zone that was officially designated a national park in 2007 (Fritz-Vietta, Röttger, & Stoll-Kleemann, 2009). Both biosphere reserves contain community-based natural resource management areas, where management is undertaken by the local population. In these areas, particular regulations governing resource extraction are in force.

In Madagascar, legislation was introduced in 1996 to facilitate the transfer of resource-management rights to local populations. The aim was to increase the involvement of local people in management activities in and around protected areas, and to legalise sustainable resource usage (Antona et al., 2004; Sarrasin, 2009). New communal associations were created and awareness-raising initiatives were implemented (Kull, 2002). Local rules (*dina*) were integrated into land management contracts. Nevertheless, the newly established *dina* did not always correspond to local cultural norms, such as that of *fiavanana*, which denotes the solidarity between family members (Andriamalala & Gardner, 2010; Fritz-Vietta, Röttger, & Stoll-Kleemann, 2009). If delinquents are caught but have family members who are involved in the punishment process, *dina* loses its legitimacy (Fritz-Vietta, Ferguson, Stoll-Kleemann, & Ganzhorn, 2011). These community-managed areas generally consist of zones around protected areas that are not associated with prevailing beliefs in spirits, or areas that are *fady* (taboo). As a result, these zones that were allocated for sustainable use have in practice been turned into non-use zones, resulting in further limitations on the local population's access to natural resources. This research is thus rooted within an important



**Table 1**  
Demographic data concerning interviewees.

|                           |                          |   |                        |
|---------------------------|--------------------------|---|------------------------|
| Mananara-Nord<br>(n = 32) |                          |   |                        |
| Gender                    | Male: 23                 | Female: 9                               |                        |
| Age                       | Younger than 25: 2       | Between 25 and 45: 17                   | Older than 45: 13      |
| Occupations               | Farmer: 27<br>Artisan: 1 | Trader: 3<br>Fisherman/<br>woman: 2     | Teacher: 2<br>Guide: 1 |
| Sahamalaza (n = 13)       |                          |   |                        |
| Gender                    | Male: 12                 | Female: 1                               |                        |
| Age                       | Not specified            |   |                        |
| Occupations               | Farmer: 8<br>Mayor: 1    | Fisherman/<br>woman: 5<br>No mention: 2 | Teacher: 1             |

Note: Some interviewees indicated several income sources.

politico-historical context, as well as within debates concerning pragmatic guidance on achieving community acceptance of the biosphere reserves.

### 3.2. Data collection and analysis

The Mananara-Nord BR was visited twice, in 2005/2006 and in 2008, whereas all data related to the Sahamalaza Iles-Radama BR was collected in 2008. The empirical analysis in this article is based on three data sets: (1) semi-structured interviews, (2) data collection through participatory rural appraisal (PRA), and (3) organised observation. In total, 32 interviews were conducted with local people in the Mananara-Nord BR and 13 interviews with residents of the Sahamalaza BR. Residents were asked to participate on a voluntary basis. When choosing interviewees, care was taken to include a broad range of people with respect to gender, age, position/role in the village, and income source (see Table 1).

In the course of interviews conducted in 2005/2006, participants were asked for their views on the importance of the national park, the advantages and disadvantages of the BR, changes in the environment as a result of the protection schemes, and their assessment of the current and future condition of the forest and what needed to be done in order to maintain it. In addition, interviewees were asked what their preferred forest animals and plants were, and why. In 2008, the participants were asked for their views on why the natural environment should be protected and on people's relationship to nature. Answers describe interviewees' understanding of nature and the existing knowledge of the people, which may reflect the influence of the biosphere reserve and the awareness raising campaigns conducted by its staff.

The interview data was complemented by further records – comprising researcher's notes and visual and audio recordings – acquired during the PRA. The latter involved nine local community associations, including forest-user associations, women's groups, and an association of organic vanilla producers in the Mananara-Nord BR in 2008. Although the interviewees were not all aware of the existence of the biosphere reserve, they were generally familiar with the PRA method, which had been applied on previous occasions by biosphere reserve staff. Between five and ten people participated in each of the nine discussion sessions, which lasted between one and two hours. People were first asked to indicate how they used the forest on a poster and the values they associated with it. At this point, the particular kinds of forest value were not specified. Subsequently, participants were invited to discuss their answers with one another and to decide on their relative importance. PRA methods allow participants to discuss and develop their answers without any direct involvement on the part of the researcher. The researchers' involvement was limited to

introducing the topic, providing a summary of the outcome at the end of the process, and reflecting on it together with the participants (ASIA, 2002; Chambers, 1994; Kumar, 2002).

Since participants were reluctant to talk openly about traditional beliefs and spirits in front of foreigners, the data set was complemented by information gathered through field observation (concerning e.g. sacred trees in the villages) and anthropological studies on Malagasy rural society and culture. Field observation was carried out in both BRs, with researchers visiting nineteen local villages (twelve in Mananara-Nord and seven in Sahamalaza BR) during a total of three-and-a-half weeks. The group discussions and observations were conducted by two researchers who verified the content through discussions with each other, transect walks and discussions with local inhabitants. In sum, data was collected at different points in time (Mananara-Nord BR visited in 2005/2006 and 2008), in different regions (the two BRs), and by means of different techniques (primary data from interviews, PRA and field observation, and secondary data from the relevant literature). Our analysis – which is discussed in the following sections – showed that this data triangulation provided comprehensive data input regarding the perceived forest values (Flick, 2007, 2008).

For the purpose of analysis, the audio data from the interviews and the PRA group discussions were transcribed literally and then translated by a Malagasy individual familiar with the issue of natural-resource usage and with local dialects. While the interviews were conducted with simultaneous French translation, only the Malagasy conversations were written down. ATLAS.ti (a structuring response programme) was used to facilitate the analysis. In the empirical analysis, the following classificatory criteria for forest values were employed: benefits from the forest, positive relation to the forest, and aspects of the forest that are significant to the interviewees' lives. Alongside the empirical data analysis, the various ecosystem services (ESS) were classified according to natural values (either instrumental or intrinsic) as illustrated by Fig. 1.

From the empirical data, we were able to distinguish 21 forest-value-codes. These were classed as being either instrumentally or intrinsically valuable, according to the ESS value classifications discussed above. In addition, they were classed as being either of use value, ecological value, or of socio-cultural value—the three forms of value which ESS may have for human well-being. Although the MEA distinguishes between regulating and supporting services, these services are both of ecological value and were therefore combined. By relating functionings to identified forest values, the capability approach makes it possible to highlight sets of relevant capabilities. These capabilities provide an outline of the interviewees' sense of well-being, both relative to the forest and to their current living conditions (Fig. 2). This approach corresponds to the abductive research process in Glaser and Strauss' grounded theory (Glaser & Strauss, 1967). This abductive approach was adopted both in the data collection process – where the questions concerning the interviewees' perceptions of the environment were formulated in such a way as to retain an openness and flexibility towards the interviewee and her perspective – and in the data analysis process, where existing theory and theoretical concepts were modified on the basis of empirical data. The evidence base represents only a small fraction of the possible answers that might have been given, since local cultural interpretations rarely coincided with a Western mindset. This allowed for more informal forms of dialogue. The data set is therefore not considered to be comprehensive. Nor should it be interpreted as a snapshot of all pertinent local views on the management of the BRs. This approach did, however, succeed in identifying and incorporating essential forms of forest value into its analysis so as to transform theoretical concepts into practical outcomes.

**Table 2**  
Forest resource use.

|   |
|---|
| Main uses of forest resources (ranked in order of importance) |
| House construction  |
| Furniture making ( <i>menuiserie</i> )                        |
| Medicinal plants (health provision)                           |
| Firewood  |
| Further uses of forest resources (not ranked)                 |
| Handicrafts/basket-weaving                                    |
| Decoration/flowers  |
| Bridge construction; pirogue construction                     |
| Food provision for human beings and animals                   |
| Pestle and mortar (for rice)                                  |
| Caskets   |
| Roofing material  |
| Game (wild animals)   |
| Paper production  |
| Honey production  |
| Drinking water  |

## 4. Results

### 4.1. Classification of forest values

#### 4.1.1. Use value

The benefits provided by tangible forest products constitute an essential value group for local people. Interviewees often spoke of how they used forest resources in order to maintain their livelihoods—primarily for subsistence purposes but also in order to secure a cash income. This is in line with the definition of provisioning ecosystem services. In group discussions, participants ranked wood for house construction as the most important forest resource, followed by wood for furniture-making (*menuiserie*), medicinal plants, and firewood. They also named a number of other uses that were not ranked (see Table 2).

The use of forest resources is heavily related to the satisfaction of basic human needs. Such resources include drinking water and some foods. People's livelihoods are also oriented around these conditions. Houses, for example, are made of wood, since it is the most common construction material available. "Clay bricks can only be afforded by rich people", one interviewee noted. There are few alternatives to the predominant way of life. Though tourism provides a potential alternative income source – a point that was also noted by the interviewees – it is not yet a viable substitute since very few tourists visit the case study areas. The values discussed here are of instrumental value because they are used as means to an end and substitutes can generally be found for them. This means that if a resource is not available it can be replaced by another—wood from domestic trees, for example, can be replaced by imported boards. Nevertheless, in remote areas of Madagascar such as these two biosphere reserves, alternative materials are either not yet available, or where they are, people cannot afford them. Particular trees that are of instrumental value (such as rosewood) may also possess significant intrinsic value (see Section 4.1.3).

#### 4.1.2. Ecological value

In group discussions, participants named various forest services that are valuable insofar as they promote ecological integrity. Water, fertile soil, protection against soil erosion, habitat for wild animals, and purified air were emphasised and ranked according to their importance. These ecological values are forms of regulating or supporting services, and are intrinsically valuable. In individual interviews, respondents not only acknowledged these elements, but also demonstrated an awareness of their ecological interdependence: "If the forest is degraded, the likely consequences are both decreased rainfall and the absence of shelter, which in turn will

result in the lowering of river beds, a lack of water, and soil erosion." At the same time some of these ecological values, such as water and fertile soil, are important prerequisites in local cultivation practices of slash-and-burn-agriculture (locally called *tavy*), and are therefore also of instrumental value. Interviewees often spoke of how their cultivation practices were closely connected to the forest. Ecological value is thus a form of instrumental value (direct use). Furthermore, local people perceive ecological processes as vital elements for the improvement of environmental resilience and their own living conditions (indirect use).

#### 4.1.3. Socio-cultural value

Local people were also asked about their preferred forest plants and animals. Almost all interviewees named lemurs as their preferred animal and precious trees like *hazovola*, *nanto* and rosewood as their preferred plants. They consider these forest species valuable because both lemurs and precious woods are integral to the ecosystem and play a crucial role in its functioning. They are thus ecologically valuable. But they also have aesthetic value. "They [the trees] are beautiful for the eyes". Another resident stated that "Nothing is more beautiful than lemurs. I admire them, and they are also useful". He continued, "Lemurs support the regeneration of plants because they eat the fruits of the trees and distribute seeds with their droppings allowing the trees to regrow".

The ecological/aesthetic importance of these endemic species was clearly articulated. Interviewees also spoke about them with great pride. Consequently, as well as speaking about their use of forest resources and ecological values, people expressed their feeling of responsibility for these species' continued existence, thus implying a sense of stewardship. The respondents also stated that the continued existence and growth of the forest is indispensable for future generations and for their long-term livelihoods. A *chef de fokontany* said, "It is most important that nature is conserved and that plants and animals can proliferate, especially those which allow our descendants to live in these beautiful natural surroundings later on." Furthermore, the forest teaches children about natural and ecological conditions and is therefore of educational value for younger generations.

The interviewees spoke of spirits that live in the forest, but were reluctant to discuss them in detail. Such reticence is one of the subtle difficulties one encounters in conducting interviews on, and attempting to translate, deeply held spiritual values. It was also evident that sacred trees are to be found in many villages. These are surrounded by fences, and people are not allowed to touch them because their presence ensures the well-being of the village. Another sacred tree near a village was, for example, *protected* by a stone that everybody was obliged to touch before approaching and leaving the tree, in order to show respect for its spirits. In general, these socio-cultural elements are intrinsically valuable since they exist to their own end and are respected by the local people. One exception has to be mentioned here. The value of the natural environment for future generations turned out to be both instrumental and intrinsic: this environment is instrumentally valuable insofar as it has use value (i.e. in maintaining future generations' livelihoods), and it is intrinsically valuable insofar as it has socio-cultural value (the beautiful natural surroundings can be enjoyed by future generations). All of the introduced values are listed in Table 3, where they are classified according to their value category and related to ecosystem services.

In both of the biosphere reserves, people's livelihoods are very much oriented around the direct and indirect use of natural (forest) resources. This explains why people gave particular emphasis to resources with use value such as wood and medicinal plants and ecologically valuable, land use-related services such as water for irrigation and soil fertilisation. Similar results published by Pfund et al. (2011) confirm that resource and land use play a decisive role

**Table 3**  
Forest values as perceived by local people—classified according to their value category and ecosystem services applicable to them.

| Value categories                  | (A) Instrumental value (“good” as means for humans and other living entities); generally substitutable  | (B) Intrinsic value (“good” as ends for humans and other living entities); generally non-substitutable   |
|-----------------------------------|---|--|
| Ecosystem services                |   |  |
| Provisioning services             | <i>Use value:</i> Wood, medicinal plants, food, material for handicrafts, decoration, tourism, drinking water, for future generations         | (Research)   |
| Regulating or Supporting services | <i>Ecological value (direct use):</i> Water for irrigation, soil fertilisation, protection against erosion, shelter, habitat for wild animals | <i>Ecological value (indirect use):</i> Water, soil fertilisation, protection against erosion, shelter, habitat for wild animals, purified air, improvement of environmental conditions (climate), rain, protection against heat |
| Cultural and spiritual services   |   | <i>Socio-cultural value:</i> For future generations, aesthetic value, education for the younger generation, stewardship, growth, spiritual value, community identity   |

in shaping local perceptions of the forest. Furthermore, interviewees noted those values that both shape the existing bonds between human beings and nature and have the capacity to support life in the long term (see Fig. 4). This view is exemplified by a local resident’s statement that “human health needs nature”. This relationship can be of both instrumental and intrinsic value to the local people.

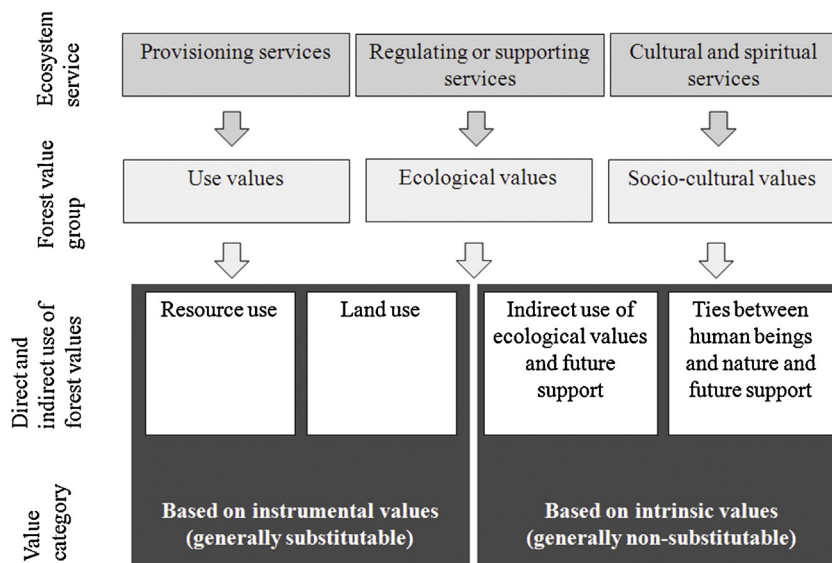
4.2. Forest values: Elements of well-being

In Madagascar, the knowledge and proficiency needed to make use of forest resources are still prevalent in rural areas where people rely on the natural resources in their vicinity (Byg & Balslev,

2001). People know, for example, how to construct homes made of hard wood from the forest and how to employ medicinal plants (e.g. Novy, 1997). At the moment, local livelihoods are directly dependent on these provisioning forest services. Access to forest resources and the skills to process and use them represent an important set of capabilities for the Malagasy people. This is not only true in case of forest resources, but also for all natural resources that are used and transformed into productive and cultural assets. The attention given by interviewees to irrigation, soil fertilisation, and the prevention of erosion, shows us that these are important aspects of successful cultivation. This observation tallies with the findings of McConnell (2002), and of Styger, Rakotondramasy, Pfeffer, Fernandes, and Bates (2007) in Madagascar, and Sileshi et al. (2009) elsewhere in Africa. Successful agricultural production depends on ecological understanding, physical strength, and the availability of fertile land and water, among other forest qualities (McConnell, Sweeney, & Mulley, 2004). In addition, knowledge of suitable farming methods, access to usage rights, and the physical and technical ability to work the soil all constitute further examples of relevant agricultural capabilities. Nonetheless, these examples of capabilities vary from place to place depending on the local population’s degree of access and proximity to forests (Urech, Rabenilalana, Sorg, & Felber, 2010). Capabilities which relate to natural resource and land use are therefore related to instrumental values, which can be substitutable.

Most people living in the BRs, however, are dependent on the available forest resources and terrain since they do not have access to substitutes outside the forest (Fedele, Urech, Rehnus, & Sorg, 2011). Their livelihoods are thus dependent on the capabilities that are bound up with the use of these particular resources. These resources would then only become truly replaceable if alternative ways of living were developed, involving different capabilities.

Ecological values such as pure air, improved environmental conditions, or protection against heat and rain, can also be translated into human capabilities. Two such capabilities are the opportunity to enjoy the existence of the forest and to benefit from its expansion. If forest deterioration occurs, local people lose these capabilities, which are crucial to their current and future well-being. In Malagasy communities, the idea of being the progeny of older generations and the progenitors of future generations plays a prominent role in social life. It serves to emphasise the individual’s role in promoting a family’s or a clan’s well-being and continued



**Fig. 4.** Ecosystem services in relation to forms of forest value and the resulting benefits to the local population (forms of use). Diagram based on empirical data collected in the Mananara-Nord and Sahamalaza biosphere reserves.

**Table 4**  
Human capabilities categorised in relation to instrumental and intrinsic forest values and types of ecosystem services.

| Human capabilities                | (A) Human capabilities based on instrumental values  | (B) Human capabilities based on intrinsic values   |
|-----------------------------------|--|--|
| Ecosystem services                |  |  |
| Provisioning services             | <i>Underlying value group (UVG): Use value</i><br>- Access<br>- Knowledge<br>- Skills...                                     |  |
| Regulating or Supporting services | <i>UVG: Ecological value (direct benefit)</i><br>- Access (land title)<br>- Knowledge<br>- Physical capacities<br>- Tools... | <i>UVG: Ecological value (indirect benefit)</i><br>- Opportunity to enjoy the existence of the forest<br>- Opportunity to benefit from its proliferation...                                      |
| Cultural and spiritual services   |  | <i>UVG: Socio-cultural value</i><br>- Identity and life insurance<br>- Feeling accountable<br>- Space for ancestral spirits<br>- Time to enjoy beauty<br>- Maintenance of a healthy condition... |

existence (Keller, 2009). Well-being is therefore not only determined with respect to each individual's own life, but also with respect to the lives of his or her family members (especially his or her children), and the broader community in which they live. The wish to maintain the forest for future generations indicates a collective desire to pass on the current natural resources and customary tenure rights to future generations (Muttenezzer, 2010). The forest thus provides a guarantee of future well-being as well as securing a sense of identity and kinship for the current generation.

When people speak of the spiritual value of the forests, they often refer to their belief in spiritual beings who govern access to, and the use of, natural resources (Moizo, 2003). Ancestral spirits are also venerated as the invisible roots and sources of being (Cole & Middleton, 2001). Ancestors are often buried in the forest. Access to these "terres sacrées", as well as any resource exploitation in these areas, is strictly controlled. It is said that those who lose the connection to their ancestors lose their social identity, whereas if the ancestors remain present and are kept satisfied, the one's well-being is secured. Respecting ancestral spirits and providing space for them can be considered as important enduring capabilities to Malagasy people. Table 4 provides an overview of the human capabilities discussed above, showing their relation to the various forms of forest value and the various types of ecosystem services.

## 5. Discussion

The results of this study are twofold. First, the study identified and described the valuable natural qualities that local people associate with the forest. For rural people in Madagascar, forests are endowed with various forms of use value, ecological value, and socio-cultural value through the ecosystem services they provide (MEA, 2003a; Yang et al., 2015). These values provided by the forest were defined as being either of instrumental or intrinsic value, depending on the way in which they promote human well-being. Generally, those services that are of instrumental value are more prominent since they play a part in the daily lives of the local population. They fulfil people's immediate needs, for example, food and shelter. The intrinsically valuable aesthetic and spiritual services provide the immaterial elements of well-being and can also serve to orient different conceptions of the forest resource and thus more empathetic behaviour towards it. A medicinal plant used to

heal, for example, is of instrumental value. Yet this plant also has a spiritual significance (Byron & Arnold, 1999), and in this respect it possesses intrinsic value, which renders it especially worthy of conservation. Another defining characteristic of intrinsic values is their importance for the collective. The collective well-being is felt to be served, for example, by a respectful relation to the community's ancestors and by the protection of areas of the forest for the benefit of future generations, which are intrinsically valuable. The same is true of ecological intrinsic values such as water provision and the improvement of environmental conditions, both of which contribute to the well-being of the community.

Distinguishing between instrumental and intrinsic values makes it possible to consider the distinctive contributions these natural values make to well-being. At the same time, these categories are inherently interconnected. The intrinsic value protected forest for future generations is related to the instrumental value of forest resources for future generations. Educating younger generations raises their ecological and cultural understanding and therefore their capacity to appreciate the instrumental value of medicinal plants and ability to find sources of food. Fertile soil that is suitable for agricultural use is important for the future viability of the forest, and is thus both instrumentally and intrinsically valuable. Furthermore, in the study sites in question, both instrumental and intrinsic values are inextricably tied to the question of conservation and the notions of sustainability and sustainable development, since safeguarding the forest is essential to guarantee continuance of all of these values (McCauley, 2006).

Second, in order to define the relationship between nature and human well-being, this study brought together three concepts: (1) ecosystem services, (2) natural values, and (3) human capabilities (Fig. 2). This led to two notable findings. First, relating ecosystem services to natural values allows us to envision new ways of valuing ecosystem service, beyond economic forms of valuation (Wegner & Pascual, 2011). The interviewees stated that both instrumental and intrinsic values were essential to their lives. Table 3 gives an overview of the clustering of these elements. It thus shows the intrinsic value of cultural ecosystem services, which has important implications both for the well-being of local communities and for conservation practices. On the one hand, the important contribution made by intrinsic values to well-being indicates the significance of cultural ecosystem services for rural Malagasy people. On the other hand, intrinsic values can also play a part in shaping local peoples' aspirations and their relations to nature, and may promote community supported conservation. This would allow for the more sensitive integration of local people's knowledge into biosphere reserve management practices. This might be achieved through the regular collection of data on qualities of specific ecosystems that are held to be valuable by local populations and classifying these according to ecosystem service categories.

Further, local people's perceptions of the valuable services provided by the forest, as assessed through empirical studies, could be matched up to those human capabilities required for the achievement of well-being in the Malagasy environment. Despite the important overlap, distinguishing between instrumental and intrinsic values helps in turn to distinguish those human capabilities which are necessary for the maintenance of a livelihood from those which promote well-being. In drawing these distinctions, we emphasised the importance of a comprehensive understanding of human well-being (Rogers et al., 2012). Fig. 5 illustrates the relationship between ecosystem services, forms of forest usage, and the associated capabilities that contribute to the achievement of human well-being.

This new approach places peoples' well-being and its relation to nature in the centre. The Malagasy example, for its part, helps to identify the direct links between human beings and nature. In order to promote both conservation and development that gives



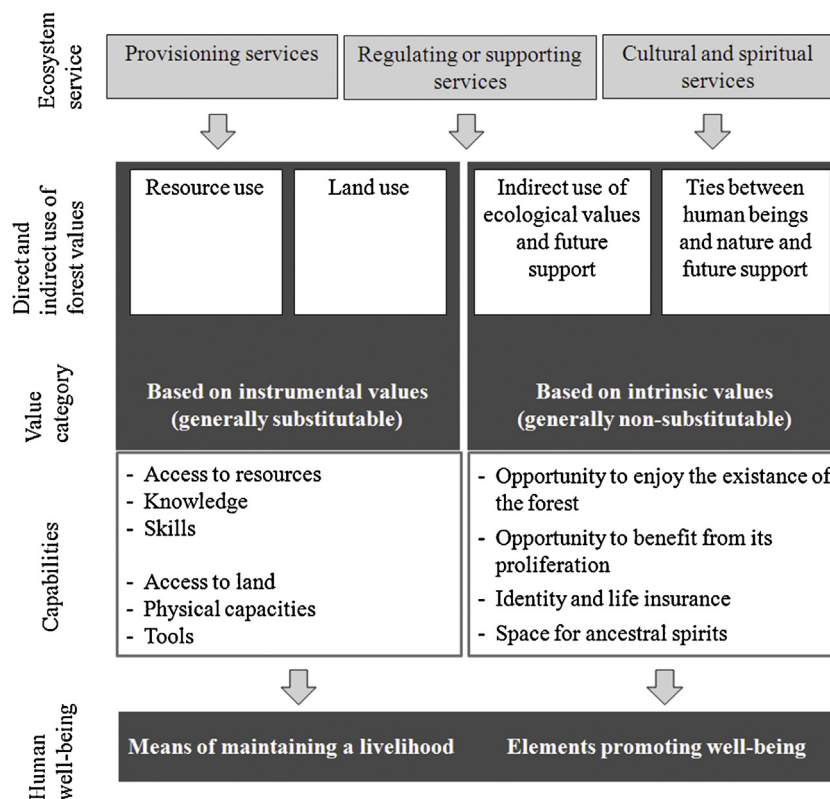


Fig. 5. Examples of human capabilities based on instrumental and intrinsic forest values that define peoples' well-being in the two Malagasy biosphere reserves.

due regard to indigenous natural resource and land management, the local peoples' existing capabilities should be strengthened and the development of new capabilities should be fostered.

## 6. Conclusion

This article explored the link between nature and human well-being. Ecosystems provide services to human beings that foster their well-being. For those who benefit from them, these services can be classified according to various forms of forest value (use, ecological and socio-cultural value). By categorising forest values as either instrumentally or intrinsically valuable we were able to explore the manner in which they and corresponding ecosystem services contribute to human well-being. Finally, the corresponding human capabilities were seen to be the defining elements of well-being.

The advantage is that, in naming forest values, the local population itself specifies the elements that contribute to well-being. There is therefore no pre-given set of capabilities that are assumed to contribute to well-being, but rather an open process in which these are defined according to the particular context. The Malagasy example clearly shows that the link between nature and well-being involves both material and immaterial elements of well-being, both of which should be taken into account in sustainable land management. This can be achieved by enabling communication between the relevant stakeholders in the biosphere reserves in regard to their conceptions of the value of the forest and the capabilities it fosters. This will serve to bring to light the relationship between forests and well-being. Based on this awareness local people can start discussions about on the one hand measures to conserve natural values and on the other hand further opportunities of living that promote their well-being (Sen, 2009). An inherent development can thus be facilitated, i.e. people themselves are at the centre of the development process. Capabilities can be developed which

allow new forms of livelihood to be maintained and which ensure cultural integrity for both present and future generations.

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