

WORKING DRAFT

NOT TO BE CITED

(January 2007)

# ***Assessing the Human Impact of Protected Areas***

**Commissioned by:** IIED and UNEP-WCMC

**Prepared by:** Alessandra Giuliani

## ***Acknowledgements***

The author would like to thank, for their extensive comments and helpful suggestions Bill Adams, Grazia Borrini-Feyerabend, Dan Brockington, Bruce Campbell, Marcus Colchester, Nicholas Conner, Alex de Sherbinin, Barney Dickson, Joanna Elliott, Abigail Entwistle, Jerry Harrison, Norbert Henniger, Robert Hoft, Katherine Homewood, Valerie Kapos, Ashish Kothari, Marc Levy, Ian May, James Mayers, Gonzalo Oviedo, Kent Redford, Liesbeth Renders, Nick Salafsky, Lea Scherl, David Thomas, Bhaskar Vira, Matt Walpole, David Wilkie.

Thanks are also due to IIED and UNEP-WCMC, and in particular to Dilys Roe, Charles Besancon and Jon Hutton, for supporting this effort.

Any mistakes are the author's alone and should not be attributed to IIED, UNEP-WCMC or to the reviewers.

## ***Working Draft***

This document is a preliminary draft which is made available only for purposes of discussion and revision by the people among whom it will be circulated.

In particular, reviewers are expected to draw on this preliminary document to provide:

- comments, observations, and criticisms on the contents, as well as on the approach, used in this analysis
- further suggestions about documents, projects and organisations that are significant for the purpose of this research and that should therefore be included in this review

*“Not everything that counts can be measured.  
Not everything that can be measured counts”*

*- Albert Einstein*

# ***Table of Contents***

|  |            |
|--|------------|
| <b>List of Acronyms</b> .....  | <i>iii</i> |
| <b>Executive Summary</b> .....   | <i>v</i>   |
| <b>1. Background</b> .....   | <i>1</i>   |
| <b>2. Introduction</b> .....   | <i>2</i>   |
| 2.1 Background and Rationale for the Research.....   | <i>2</i>   |
| 2.2 Objective of the Study.....  | <i>3</i>   |
| 2.3 The Research: Methodology and Limits.....  | <i>3</i>   |
| 2.4 Structure of the Report.....   | <i>3</i>   |
| 2.5 Poverty, Environment, Poverty-Environment Linkages and Protected Areas.....  | <i>4</i>   |
| <b>3. Socio-Economic Indicators</b> .....  | <i>6</i>   |
| 3.1 Indicators: Definition and Key Characteristics.....  | <i>6</i>   |
| 3.2 A Set of Socio-Economic Indicators.....  | <i>7</i>   |
| 3.3 Conclusions on Socio-Economic Indicators.....  | <i>9</i>   |
| 3.4 Indices.....   | <i>10</i>  |
| 3.5 Human Development Indices.....   | <i>10</i>  |
| 3.6 Other Indices.....   | <i>11</i>  |
| 3.7 Conclusions on Socio-Economic and Environmental Indices.....   | <i>12</i>  |
| <b>4. Poverty-Environment Indicators</b> .....   | <i>13</i>  |
| 4.1 What Are ‘Poverty-Environment Indicators’? .....   | <i>13</i>  |
| 4.2 A Review of Studies on Poverty-Environment Indicators.....   | <i>13</i>  |
| 4.3 A Set of Poverty-Environment Indicators.....   | <i>14</i>  |
| 4.4 Conclusions.....   | <i>16</i>  |
| <b>5. Poverty Mapping</b> .....  | <i>17</i>  |
| 5.1 Creating Poverty Maps.....   | <i>17</i>  |
| 5.2 Examples of Initiatives Aimed at Mapping Human Welfare and Poverty.....  | <i>18</i>  |
| 5.3 CIESIN Global Poverty Mapping Project.....   | <i>19</i>  |
| 5.4 Conclusions.....   | <i>20</i>  |
| <b>6. Participatory Approaches</b> .....   | <i>21</i>  |
| 6.1 A Framework to Monitor the Contribution of BirdLife’s Work to Poverty Alleviation.....   | <i>21</i>  |
| 6.2 A Conceptual Framework to Assess the Livelihoods and Biodiversity Impacts of Conservation Activities at the Landscape Level..... | <i>21</i>  |
| 6.3 Assessing the Effects on Human Well-being of Establishing Protected Areas to Conserve Biodiversity.....                          | <i>21</i>  |

|  |           |
|--|-----------|
| 6.4 Assessing the Socio-Economic Status of People Living Near Protected Areas in the Central Albertine Rift..... | 22        |
| 6.5 Applying the Sustainable Livelihoods Approach to Assess the Impacts of Wildlife Enterprises.....             | 22        |
| 6.6 Assessment of Protected Areas Costs and Benefits.....  | 22        |
| 6.7 Conclusions.....   | 23        |
| <b>7. Other Relevant Initiatives.....</b>  | <b>24</b> |
| 7.1 Conceptual Models.....   | 24        |
| 7.2 Further Studies, Initiatives and Potential Partners.....   | 25        |
| <b>8. Conclusions.....</b>   | <b>28</b> |
| <b>Bibliography.....</b>   | <b>31</b> |
| <b>Appendix A - Socio-Economic Indicators and Indices.....</b>   | <b>34</b> |
| <b>Appendix B - Poverty-Environment Indicators.....</b>  | <b>41</b> |
| <b>Appendix C - Poverty Mapping.....</b>   | <b>53</b> |
| <b>Appendix D - Participatory Approaches.....</b>  | <b>63</b> |
| <b>Appendix E - Annotated Bibliography.....</b>  | <b>73</b> |
| <b>Appendix F - Relevant Websites.....</b>   | <b>83</b> |
| <br><b>List of Figures</b>   |           |
| Figure 7.1 Components of the General LMMA Model.....   | 24        |
| <br><b>List of Tables</b>  |           |
| Table 3.1 A Set of Socio-Economic Indicators.....  | 7         |
| Table 4.1 A Set of Poverty-Environment Indicators.....   | 14        |

## ***List of Acronyms***

|         |   |
|---------|---|
| ADB     | Asian Development Bank  |
| AWF     | African Wildlife Foundation   |
| CCF     | Cambridge Conservation Forum  |
| CDIAC   | Carbon Dioxide Information Analysis Center                                    |
| CEESP   | Commission on Environmental, Economic and Social Policy                       |
| CGIAR   | Consultative Group on International Agricultural Research                     |
| CI      | Conservation International  |
| CIAT    | International Center for Tropical Agriculture                                 |
| CIESIN  | Center for International Earth Science Information Network                    |
| CMP     | Conservation Measures Partnership   |
| CPRC    | Chronic Poverty Research Centre   |
| CRED    | Centre for Research on the Epidemiology of Disasters                          |
| DAC     | Development Assistance Committee  |
| DFID    | Department for International Development (UK)                                 |
| DGIS    | Directorate-General for International Cooperation                             |
| DHS     | Demographic and Health Survey   |
| DSS     | Demographic Surveillance Systems  |
| EF      | Ecological Footprint  |
| EPI     | Environmental Performance Index   |
| ESI     | Environmental Sustainability Index  |
| FAO     | Food and Agriculture Organization   |
| FFI     | Fauna and Flora International   |
| GDI     | Gender-Related Development Index  |
| GDP     | Gross Domestic Product  |
| GIS     | Geographic Information System   |
| HABITAT | United Nations Centre for Human Settlements                                   |
| HDI     | Human Development Index   |
| HDR     | Human Development Report  |
| HPI     | Human Poverty Index   |
| IAIA    | International Association for Impact Assessment                               |
| IBA     | Important Bird Area   |
| ICEM    | International Centre for Environmental Management                             |
| IEA     | International Energy Agency   |
| IFAD    | International Fund for Agricultural Development                               |
| IGCP    | International Gorilla Conservation Programme                                  |
| IIED    | International Institute for Environment and Development                       |
| IISD    | International Institute for Sustainable Development                           |
| ILO     | International Labour Office   |
| IMF     | International Monetary Fund   |
| IMR     | Infant Mortality Rate   |
| IMS     | Internet Map Server   |
| IRF     | International Road Federation   |
| IS      | Integrated Surveys  |
| ISIN    | International Sustainability Indicators Network                               |
| IUCN    | International Union for the Conservation of Nature (World Conservation Union) |
| LLMA    | Locally-Managed Marine Area   |
| LSMS    | Living Standards Measurement Study  |
| MA      | Millennium Ecosystem Assessment   |
| MDG     | Millennium Development Goal   |
| MICS    | Multiple Indicator Cluster Survey   |
| MPO     | Macroeconomics Programme Office   |
| NGO     | Non Government Organisation   |
| NOAA    | National Oceanic and Atmospheric Administration                               |
| NPWS    | New South Wales National Parks and Wildlife Service                           |
| ODI     | Overseas Development Institute  |
| OECD    | Organisation for Economic Co-operation and Development                        |
| PA      | Protected Area  |

|                        |   |
|------------------------|---|
| PAD                    | Protected Area Development  |
| PAGE                   | Pilot Analysis of Global Ecosystems                                       |
| PCLG                   | Poverty and Conservation Learning Group                                   |
| PEP                    | Poverty Environment Partnership   |
| PPA                    | Participatory Poverty Assessment  |
| PPP                    | Purchasing Power Parity   |
| PRSP                   | Poverty Reduction Strategy Paper  |
| PS                     | Priority Survey   |
| SIS                    | Species Information Service   |
| SL                     | Sustainable Livelihood  |
| TILCEPA                | Theme on Indigenous and Local Communities, Equity and Protected Areas     |
| UNDESA                 | United Nations Department of Economic and Social Affairs                  |
| UNDP                   | United Nations Development Programme                                      |
| UNECE                  | United Nations Economic Commission for Europe                             |
| UNEP                   | United Nations Environment Programme                                      |
| UNEP-WCMC              | United Nations Environment Programme-World Conservation Monitoring Centre |
| UNESCO                 | United Nations Educational, Scientific, and Cultural Organization         |
| UNICEF                 | United Nations Children's Fund  |
| UN Population Division | United Nations Population Division  |
| UNSD                   | United Nations Statistics Division  |
| USAID                  | United States Agency for International Development                        |
| WB                     | World Bank  |
| WCPA                   | World Commission on Protected Areas                                       |
| WCS                    | Wildlife Conservation Society   |
| WDI                    | World Development Indicators  |
| WDPA                   | World Database on Protected Areas   |
| WELD                   | Wildlife Enterprise and Local Development Project                         |
| WHO                    | World Health Organization   |
| WRI                    | World Resources Institute   |

---

## **Executive Summary**

This working paper summarises the result of a research carried out between September and December 2006 with the aim of reviewing existing methodologies and indicators that can be used to assess the human impact of protected areas. This work was implemented as a joint initiative between the PCLG and UNEP-WCMC.

The main motivations for engaging in this research were the following:

- no obvious methodology to assess the human impact of protected areas exists;
- no clearly defined body of knowledge exists regarding methodologies and indicators that could be used to assess the human impact of protected areas.

The current research was carried out through a:

- desk review of available literature (published and unpublished documents, reports, scientific articles, grey literature, etc.);
- review of information available on-line (websites, e-documents, etc.);
- discussion with key individuals (in person, whenever possible; via phone or e-mail in all other cases).

Much more knowledge and experience has been produced on methodologies and indicators that can be used to assess the human impact of protected areas than the one presented in this working paper. Unfortunately, many factors undermine the ability of gathering all the relevant information on this topic:

- various organisations have, over the past decade, engaged in activities aimed at assessing the human impact of specific conservation projects, some of which carried out in protected areas. However, the results of these assessments initiatives are often contained in unpublished reports that are difficult to identify and access. In other cases, these initiatives have never been formally reviewed, and there is no written record of the evaluation performed;
- most of the work carried out with the aim of developing methodologies and indicators to assess the human impact of protected areas is very recent, if not ongoing. As a consequence, the organisations and teams of researchers engaged in it have not had the time yet to document their work;
- finally, the time available to complete this research was limited, especially considering the breadth of the topic.

For all these reasons, the present document should be interpreted not as a finished product but as a 'working' document, that will develop and improve over time as more documents and experiences become available.

In addition to these difficulties, there are numerous intrinsic problems linked with assessing the impact that PAs have on people:

- **Scale:** to be truly comprehensive, an assessment of the human impact of protected areas should cover all impacts deriving from the implementation of the protected area both in the short and in the long term, as well as on a local, national, regional and global scale.
- **Commensurability:** PAs can have a wide variety of impacts on people and, independently of the assessment method adopted, some of these impacts will always be very difficult to compare.
- **Baseline assessment:** Very rarely we have baseline data referring to the welfare of local households before a park was established. As a consequence, any data we can acquire on household's present welfare loses a lot of its meaning, as we do not have anything to compare it to.
- **Cultural differences:** poverty, environment, and poverty-environment linkages are all very complex and broad concepts, which are often perceived very differently by different people (where by 'people' we mean not only indigenous people, but also researchers, decision makers, etc.).

Bearing in mind all these limitations, this report reviews a number of possible methodologies and indicators that could be used to assess the human impact of PAs and presents them



according to the following generic categories: socio-economic indicators and indices, poverty-environment indicators, poverty mapping, participatory approaches, and further relevant projects and initiatives.

Based on this preliminary research work, some comments can be made on methodologies and indicators that could be used to assess the human impact of PAs:

- Choosing a set of already developed indicators, or indices, or a combination of the two, to assess the human impact of PAs, is definitely a possibility. In chapter 3 and 4 we have made an attempt to identify such sets of indicators and indices, by collating the indicators and indices that have been most commonly used in this type of studies in the past. In summary:
  - experience seems to suggest that 15-30 indicators are enough to cover all significant aspects of a given situation, while still being manageable;
  - past studies suggest that it is possible to identify a generic set of indicators that is representative of all issues relevant to the poor. However, given a generic set of indicators, not all these indicators will necessarily have to be used in each situation;
  - despite its many limits, the UNDP
  - Human Development Index remains one of the best measure available to quantify overall human well-being.
- Many researchers agree that a specific type of indicators, the so-called poverty-environment indicators, have a better potential, compared to just poverty or just environment indicators, to capture the complexity of the relationship linking poverty and the environment. However more effort should be put in developing better quality poverty-environment indicators, and great care must be used when implementing these indicators and in the interpretation of the results provided by them.
- Poverty mapping has numerous potential advantages as a tool to assess the impact of protected areas on people. One study in particular (de Sherbinin 2006) has proved how poverty maps could be used to explore the linkages between poverty and PAs. However, this study has also highlighted the most important limit of this methodology, which is the lack of data availability at a detailed scale.
- Socio-economic indicators, poverty-environment indicators and poverty maps are all methodologies ultimately based on some external actor's opinion (e.g. researcher, decision maker, etc.) of what is relevant for the well-being of local people. From this point of view we could define these as top down approaches. Another possible approach to the issue of evaluating the human impact of PAs is to ask local people what they believe is important for their well-being, and to create indicators based on their answers. This approach can be described as bottom up or participatory. Compared to top down approaches, participatory approaches have the advantage of measuring what is really relevant to local people, therefore indicators developed locally are more meaningful; however, when dealing with this type of indicators it is more difficult to make comparisons at the local, national, regional or global level. In addition, participatory approaches are very time consuming and expensive.
- Finally, many studies suggest that, in order to achieve a significant assessment of a process or situation, it might be useful to combine more than one evaluation technique, for example indicators and qualitative assessments.

# 1. Background

This working paper summarises the result of a research carried out between September and December 2006 with the aim of reviewing existing methodologies and indicators that can be used to assess the human impact of protected areas. This work was implemented as a joint initiative between the PCLG and UNEP-WCMC.

The PCLG (Poverty and Conservation Learning Group) is an initiative launched in 2004 by IIED (International Institute for Environment and Development) to create a forum for facilitating mutual learning among key stakeholders on the linkages between poverty alleviation and biodiversity conservation. The PCLG pursues its mission by facilitating the sharing and dissemination of information and experience on conservation-poverty linkages, by organising and supporting learning events, and, whenever possible, by engaging in research and other activities around three key thematic areas: policy processes, governance, and impacts.

UNEP-WCMC (World Conservation Monitoring Centre), and in particular its Protected Areas Programme, recently developed a project concept called 'Vision 2020'. This project aims to establish a process for the periodic assessment of the biodiversity value, management effectiveness and human impact of a subset of the world's protected areas, so as to be able to demonstrate the contribution that protected areas are making to conservation and development, and how this is evolving over time. While sound indicators and frameworks already exist to assess the management effectiveness of protected areas and their impact on conservation, no obvious methodology has been identified so far that could be used to assess the human impact of protected areas.

Given their shared interest in reviewing the state of the knowledge on methodologies and indicators that can be used to assess the human impact of protected areas, the PCLG and UNEP-WCMC decided to form a partnership and co-sponsor the present research work. The results of this research will however be used in different ways by the two organisations:

- For UNEP-WCMC this working paper represents a background document that will support the future development of the Vision 2020 project. In particular, this research provides a useful information base on which to build to identify indicators and methodologies that UNEP-WCMC could adopt to carry out a periodic assessment of the human impact of a subset of the world protected areas.
- In fulfilment of its mandate, the PCLG will draw on this research to:
  - facilitate the sharing and dissemination of information on methodologies and indicators developed to assess the human impact of protected areas;
  - foster discussions on this topic among its members, through learning events and discussion forums;
  - produce a paper, or a series of papers, on the linkages between poverty and PAs.

## 2. Introduction

### 2.1 Background and Rationale for the Research

All over the world, protected areas (PAs) have been established by governments, non governmental organisations and private entities with the aim of conserving biodiversity, and, in most cases, without considering how the creation of PAs would affect the people depending on them for their livelihoods. As a result, today PAs are seen as a controversial tool for biodiversity conservation since, according to the mainstream narrative, they have caused the impoverishment of the local population through evictions and denial of access to natural resources. Taking into consideration the linkages between PAs and the well-being of the people living in or around them has therefore become a practical and ethical necessity. It is a practical necessity because, to survive and achieve their conservation objectives, protected areas need the support of the local population, as well as of the international community. It is an ethical necessity because, as it is widely recognised, conservation objectives cannot be pursued at the expenses of people's well-being (Scherl *et al* 2004).

The importance of considering the linkages between protected areas and local people has been acknowledged by the international community in various occasions:

- one of the actions agreed upon by the Third World Park Congress (Bali, 1982), was to promote the linkages between protected area management and sustainable development;
- at the Fourth World Park Congress (Caracas, 1992) participants agreed that the management of protected areas should always be carried out in a manner sensitive to the needs and concerns of local people;
- at the Fifth World Park Congress (Durban, 2003), participants not only recognised the interconnectedness of protected areas and people, but took it a step further by affirming that protected areas should strive to contribute to poverty reduction at the local level, and, at the very least, should not increase poverty. In addition, participants recommended that governments, donors and other development partners should improve their knowledge and understanding of the linkages between protected areas and poverty reduction, and, in particular, of the impacts (positive and negative) that protected areas have on the livelihoods of the rural poor;
- the World Conservation Congress, held in Bangkok in 2004, recognised that an assessment of the economic and socio-cultural impacts arising from the establishment and maintenance of PAs is necessary, and recommended that IUCN and other conservation organisations should provide the funds for such assessments;
- the Convention on Biological Diversity has started a Programme of Work on Protected Areas that has among its goals to promote 'governance, participation, equity and benefits sharing'.

As a consequence of this evolution in their way of thinking, many conservation and development organisations have recently started redirecting their efforts towards developing and implementing interventions aimed at achieving both biodiversity and livelihoods outcomes. These types of interventions, which address two of the main challenges faced by the international community today (biodiversity conservation and poverty alleviation), have attracted significant investments from governments and donor agencies, who increasingly call for an evaluation of the results achieved. To date numerous indicators, conceptual frameworks and methodologies have been developed to assess the impact of conservation activities on biodiversity, however, no widely accepted method has been developed to assess the human impact of protected areas (Sayer *et al* 2006b). As a result, we are running the risk that future decisions and funds directed to protected areas will be based solely on information regarding the management effectiveness of the protected area, and its ability to achieve conservation goals. Hence the importance of identifying a methodology to assess the impact that PAs have on people.

## 2.2 Objective of the Study

This working paper summarises the result of a research carried out with the aim of reviewing existing methodologies and indicators that can be used to assess the human impact of protected areas. The main motivations for engaging in this research were the following:

- no obvious methodology to assess the human impact of protected areas exists;
- no clearly defined body of knowledge exists regarding methodologies and indicators that could be used to assess the human impact of protected areas.

## 2.3 The Research: Methodology and Limits

### *Methodology*

The current research was carried out through a:

- desk review of available literature (published and unpublished documents, reports, scientific articles, grey literature, etc.);
- review of information available on-line (websites, e-documents, etc.);
- discussion with key individuals (in person, whenever possible; via phone or e-mail in all other cases).

### *Limits of the present research work*

Much more knowledge and experience has been produced on methodologies and indicators that can be used to assess the human impact of protected areas than the one presented in this working paper. Unfortunately, many factors undermine the ability of gathering all the relevant information on this topic:

- Various organisations have, over the past decade, engaged in activities aimed at assessing the human impact of specific conservation projects, some of which carried out in protected areas. However, the results of these assessments initiatives are often contained in unpublished reports that are difficult to identify and access. In other cases, these initiatives have never been formally reviewed, and there is no written record of the evaluation performed.
- Most of the work carried out with the aim of developing methodologies and indicators to assess the human impact of protected areas is very recent, if not ongoing. As a consequence, the organisations and teams of researchers engaged in it have not had the time yet to document their work. Besides, those who have had the time to document their research are not necessarily willing to share their preliminary results.
- Finally, the time available to complete this research was limited, especially considering the breadth of the topic.

For all these reasons, the present document should be interpreted not as a finished product but as a 'working' paper, that will develop and improve over time as more documents and experiences become available. In addition, it is the author's hope that this document will improve thanks to the readers' comments and suggestions on additional documents, projects and organisations that should be included in this review.

## 2.4 Structure of the Report

The present report is structured according to generic categories of methodologies and indicators that could be used to assess the human impact of PAs. Chapter three reviews socio-economic indicators and indices, chapter four poverty-environment indicators, chapter five describes poverty mapping, chapter six participatory approaches, and chapter seven reviews further relevant projects and initiatives, while the conclusions of this preliminary research are presented in chapter eight. A more in-depth description of the most important studies reviewed in the course of this research work is presented in appendixes A, B, C, and D. Appendix E contains an annotated bibliography covering all the documents reviewed during the research work. Finally, appendix F presents a list of websites which are relevant for the present research topic.

## 2.5 Poverty, Environment, Poverty-Environment Linkages and Protected Areas

This report makes a wide use of the following concepts: poverty, environment, poverty-environment linkages and protected areas. In this paragraph we briefly review these concepts to provide the reader with a common pool of notions on which the following analysis is based.

### *Poverty*

The concept of poverty has evolved greatly over the years. Until the 1960s poverty mainly referred to the level of income of an individual or an household, and the ability to meet basic nutritional requirements. Starting from the 1970s, poverty came to be defined not just as a failure to meet basic nutritional and subsistence levels, but rather as a failure to keep up with the general standards prevalent in a society. Today is widely accepted that the concept of poverty is multidimensional and should include all the most important areas in which people can experience deprivation, in different societies and local contexts.

Different frameworks have been developed to help people think about poverty, to identify the poor, and to address the underlying causes of poverty. The most commonly used frameworks are the OECD DAC (Development Assistance Committee) guidelines on poverty reduction and the sustainable livelihoods framework.

The DAC guidelines on poverty reduction (OECD 2001) identify five core dimensions of poverty:

1. Economic capabilities – meaning the ability to earn an income, to consume and to have assets
2. Human capabilities – which are based on health, education, nutrition, clean water and shelter
3. Political capabilities – which include human rights, a voice and some influence over public policies
4. Socio-cultural capabilities – meaning the ability to participate as a valued member of a community
5. Protective capabilities – which enable people to withstand economic and external shocks

According to the DAC guidelines, a good concept of poverty should not only include all dimensions of poverty, but also encompass the causal links between these dimensions and the crucial role played by gender and environmentally sustainable development in influencing these dimensions.

The sustainable livelihoods framework views people as having access to five types of capital:

1. Human capital – which represents the skills, knowledge, ability to labour and good health that enable people to pursue their livelihoods objectives
2. Social capital – meaning the social resources that people draw upon to pursue their livelihoods objectives
3. Natural capital – which refers to the natural resource stocks from which resource flows and services useful for livelihoods are derived
4. Physical capital – which comprises the basic infrastructure and producer goods needed to support livelihoods
5. Financial capital – which denotes the financial resources that people use to achieve their livelihoods objectives

The basic concept behind this framework is that the quality and sustainability of livelihoods depend on the strategies communities develop to manage their capital assets, and a deeper understanding of the factors and the relationships between them is necessary in order to plan meaningful interventions to reduce poverty.

### *Environment*

'Environment' is widely recognised as a broad term, with many interpretations and definitions. For the aim of the present research we will interpret it as encompassing genetic resources, species and ecosystems.

### *Poverty-Environment Linkages*

The last two decades have witnessed a growing interest surrounding the poverty-environment nexus. While a traditional approach portrays the link between poverty and environment as rather deterministic, pointing to the poor as the primary agents of environmental degradation, a more recent school of thought argues that this nexus is far more complex. Even if there are situations where poverty has acted as one of the causes of the deterioration of the environment, extensive fieldwork carried out throughout the world - to include both developed and developing countries, as well as different ecosystems, and different social and political situations - has provided ample evidence to confute the traditional view of the poor as environmental degraders. Recent studies have brought to light the complex web of factors governing the poverty-environment connection, and numerous conceptual frameworks have been developed to achieve a deeper understanding of a relationship that is far from straightforward.

For the goals of the present analysis, it is sufficient to remember that there are both positive and negative linkages between poverty and the environment:

- conservation activities can contribute to poverty reduction (e.g. creating jobs through sustainable tourism enterprises), like poverty reduction activities can contribute to conservation (e.g. providing alternative livelihoods opportunities that relieve dependence on natural resources);
- conservation activities can increase poverty (e.g. reduced access to natural resources), like poverty reduction activities can contribute to biodiversity loss (e.g. unsustainable logging activities).

#### *Protected areas (PAs)*

According to the *2003 UN List of Protected Areas* (Chape *et al* 2003), 12% of the world's surface is now protected, through a combination of terrestrial and marine protected areas. But what do we mean by 'protected area'? The definition of a protected area adopted by IUCN is: 'An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means' (Chape *et al* 2003:2).

IUCN has defined a series of six protected area management categories, based on primary management objective. In summary, these are:

- Category Ia - Strict Nature Reserve: protected area managed mainly for science
- Category Ib - Wilderness Area: protected area managed mainly for wilderness protection
- Category II - National Park: protected area managed mainly for ecosystem protection and recreation
- Category III - Natural Monument: protected area managed mainly for conservation of specific natural features
- Category IV - Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- Category V - Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation
- Category VI - Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

When talking about PAs in the current research, we will generally refer to all categories of PAs. It is nonetheless worth bearing in mind that, when discussing the interactions between people and PAs, categories V and VI have a particular relevance as these are the categories that, though to a different extent, recognise the most the value of human interactions with nature.

### 3. Socio-Economic Indicators and Indices

In the last decades we have witnessed a rapid increase in the development and use of indicators in the fields of conservation and development. Indicators and indices aimed at assessing the socio-economic conditions of people have been developed, implemented, tested and refined for many years now. Some of these indicators and indices have long been accepted as a good measure of some aspect of the well-being of people (e.g. infant mortality), and as a consequence a large amount of data relative to these indicators is now available.

Given the wealth of socio-economic and environmental indicators and indices available today, a solution to the problem of how to assess the human impact of protected areas could be to choose, among these, a set of indicators and/or indices that allow us to evaluate the effects that PAs have on people. In this section of the report we review past studies and experiences to evaluate the advantages and disadvantages of using socio-economic indicators and indices for this type of assessment.

#### 3.1 Indicators: Definition and Key Characteristics

In general, an indicator can be defined as something that helps us to understand where we are, where we are going and how far we are from our goal. It can be a sign, a number, a graphic and so on. Indicators are bits of information that summarize the characteristics of systems or highlight what is happening in a system. A more rigorous definition of indicators is given by the International Institute for Sustainable Development (IISD) according to which: 'an indicator quantifies and simplifies phenomena and helps us understand complex realities. Indicators are aggregates of raw and processed data but they can be further aggregated to form complex indices.'<sup>1</sup>

Much has been written about indicators, their role, and function. Here we present a few of these considerations, which might help to think about the characteristics indicators should have to be useful in the context of poverty-environment relationships.

Prennushi *et al* (2001), who define indicators as the variables used to measure progress toward the objectives that a society wants to achieve, suggest that indicators should first of all be divided in:

- Intermediate - used to monitor factors that determine an outcome, or contribute to the process of achieving an outcome
- Final - used to measure the effect of an intervention on individuals' well-being

In addition, Prennushi *et al* (2001) believe a good indicator should:

- Be a direct and unambiguous measure of progress
- Be relevant to the specific situation under analysis
- Vary across areas, groups and over time
- Be sensitive to changes in policies, programs and institutions
- Be transparent
- Be cost-effective to track

Finally, Prennushi *et al* (2001) advocate that, depending on the situation, it might be important to disaggregate indicators into: geographical areas, administrative units, gender, income, consumption, socially defined groups.

Gallopín (1997) identifies major functions of indicators as to:

- Assess conditions and changes
- Compare across places and situations
- Assess conditions and trends in relation to goals and targets
- Provide early warning information
- Anticipate future conditions and trends

---

<sup>1</sup> International Institute for Sustainable Development. 2002. *Measurement and Indicators for Sustainable Development* ([www.iisd.ca/measure/faqindicator.htm](http://www.iisd.ca/measure/faqindicator.htm)).

While Woodhouse *et al* (2000) suggest that there are different types of indicators which may be used for natural resource management:

- Generic (internationally agreed)
- Local (site specific)
- Measurement (often quantitative, precise and replicable)
- Proxy/surrogate (more indirectly related to the issue in question)

Finally, as discussed in Roche (1999), a common way to describe the properties indicators should have is by saying they should be SMART, that is: specific, measurable, attainable, relevant, and time bound.

From this brief overview it is possible to conclude that (Nunan *et al* 2002):

- Indicators must be developed in relation to specific goals and targets
- Different types of indicators can be used to achieve different objectives
- Disaggregating indicators makes data collection much more complicated, but it might be crucial to highlight differences relevant when studying the poverty-environment relationship

### 3.2 A Set of Socio-Economic Indicators

Based on a review of past studies and experiences, we have identified the indicators in table 3.1 as the most commonly used socio-economic indicators, and the most appropriate to assess the human impact of PAs.

Table 3.1 A Set of Socio-Economic Indicators

|          | Name of Indicator                     | Definition   | Primary Source of Data | Secondary data holder   | Spatial Resolution | Data Policy |
|----------|---------------------------------------|--|------------------------|---|--------------------|-------------|
|          | <b>Demographic / Human well-being</b> |  |                        |   |                    |             |
| <b>1</b> | <i>Adult illiteracy</i>               | The percentage of people aged 15 and over who cannot, with understanding, read and write a short, simple statement about their everyday life   | UNESCO                 | OECD<br>UNICEF<br>UNDP<br>UN Population Division<br>UNSD<br>WB<br>WRI | N-R-G              | Open        |
| <b>2</b> | <i>Infant mortality</i>               | The proportion of children who die before reaching the age of 12 months  | UN Population Division | OECD<br>UNICEF<br>UNDP<br>UNSD<br>WB<br>WHO<br>WRI                    | N-R-G              | Open        |
| <b>3</b> | <i>Life expectancy</i>                | The average number of years people would be expected to live if the current mortality conditions (i.e. age-specific mortality rates) prevailed throughout their lives  | UN Population Division | UNICEF<br>UNSD<br>WB<br>WHO<br>WRI                                    | N-R-G              | Open        |
| <b>4</b> | <i>Natural disasters</i>              | The number of deaths from natural and technological disasters. Natural disasters include avalanches, cold waves, cyclones, hurricanes, typhoons, drought, earthquakes and epidemics. Technological disasters include transport accidents, chemical accidents and urban fires | CRED                   | UNDP<br>UNEP<br>WHO   | N-R-G              | Open        |



|    |  |   |             |   |         |         |
|----|--|---|-------------|---|---------|---------|
| 5  | Population living below the poverty line | The percentage of the population (rural or urban) living below the national (rural or urban) poverty line   | WB          | OECD<br>UN<br>Population<br>Division<br>UNSD                                | S-N     | Open    |
|    | <b>Human health</b>                      |   |             |   |         |         |
| 6  | Health care                              | It is the proportion of the population that can expect treatment for common diseases and injuries, including essential drugs on the national list, within one hour's walk   | WHO         | OECD<br>UNDP<br>UNICEF<br>UN<br>Population<br>Division<br>UNSD<br>WB<br>WRI | N-R     | Open    |
| 7  | Malnutrition prevalence                  | The percentage of children under the age of five that are moderately or severely underweight and/or suffer from wasting and stunting  | WHO         | FAO<br>UNICEF<br>UNDP<br>UN<br>Population<br>Division<br>UNSD<br>WB<br>WRI  | N-R-G   | Open    |
| 8  | Microbial water- and food-borne diseases | Number of water-borne and food-borne disease cases per 1000 inhabitants   | WHO         | UNEP<br>WRI   | N-R-G   | Limited |
| 9  | Safe water                               | The percentage of the population with reasonable access to adequate amounts of safe water (including treated surface water and untreated, but uncontaminated water, such as from springs, sanitary wells, and protected boreholes)  | WHO         | OECD<br>UNICEF<br>UNDP<br>WB<br>WRI   | N-R-G   | Open    |
| 10 | Sanitation                               | The percentage of the population with access to least adequate excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta  | WHO         | OECD<br>UNDP<br>UNICEF<br>UNSD<br>WB<br>WRI                                 | N-R     | Open    |
|    | <b>Natural resources / Rural</b>         |   |             |   |         |         |
| 11 | Agricultural productivity                | The ratio of agriculture value added, measured in constant 1995 US dollars, to the number of workers in agriculture   | WB          |   | N-R-G   | Open    |
| 12 | Arable land                              | Land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). This category does not include abandoned land resulting from shifting cultivation. Data for "Arable Land" are not meant to indicate the amount of land that is potentially cultivable | FAO         | UNEP<br>WB  | S-N-R-G | Open    |
| 13 | Water withdrawal                         | The total water withdrawn divided by the population   | FAO<br>OECD | UNDP<br>UNEP<br>WRI   | N-R     | Open    |
| 14 | Water withdrawal by                      | The share of water withdrawn by the three main sectors (Domestic,   | FAO<br>OECD | UNDP<br>UNEP  | N-R     | Open    |

|    |                            |  |     |              |       |      |
|----|----------------------------|--|-----|--------------|-------|------|
|    | sector                     | Industrial, and Agricultural)  |     | WB<br>WRI    |       |      |
| 15 | Wood for fuel and charcoal | Roundwood, coniferous and non-coniferous, that will be used as fuel for purposes such as cooking, heating or power production, or used for charcoal production | FAO | OECD<br>UNEP | N-R-G | Open |

S = Sub national

N = National

R = Regional

G = Global

### 3.3 Conclusions on Socio-Economic Indicators

In the previous paragraphs we have defined indicators, described their characteristics, and presented a list of the most commonly used socio-economic indicators, that could be used in a research aimed at assessing the human impact of PAs. We can now draw some conclusions on the potential advantages and disadvantages offered by the use of indicators to carry out evaluations in the context of poverty and protected areas.

Generally speaking, the main appeal of indicators is that they provide a synthetic and effective way of communicating information about the state of a system, and to track progress towards specific goals. Having a synthetic way of expressing the impact that protected areas have on people is a goal that many would like to see achieved, however, it is important to bear in mind that, despite their alleged scientific nature, indicators are never neutral. Indicators are inevitably the product of the knowledge, values and strategic priorities shared by the group of people that develop and use them. In the context of poverty and protected areas this could mean that the indicators used to assess the impact that PAs have on the well-being of people might be selected by researchers and decision makers who are very distant from the reality of the people living in and around the PA, and therefore might choose a set of indicators that do not assess what is really important for local people.

Various organisations are working on the development and implementation of generic indicators. Generic indicators (like the ones in the table above) are appealing because they allow comparisons across countries and across a wide range of situations, and because they provide a way to measure performances on a global scale. However, generic indicators tend to overlook problems connected with specific local situations, which are often the most important when dealing with poverty and environment issues (Reed and Tharakan 2004). This does not mean that generic indicators should be abandoned altogether. Generic indicators can become more meaningful when adapted to the specific situation under analysis, or when studied in conjunction with local level indicators.

In general, it is best to avoid broad sets of indicators. The reason for this is that, while broad sets of indicators may provide a general understanding of a given situation, they tend to mask the most important problems facing the poor in a specific situation (Reed and Tharakan 2004). Experience seems to suggest that 15-30 indicators are enough to cover all significant aspects of a given situation, while still being manageable.

### 3.4 Indices

According to the International Institute for Sustainable Development (IISD), indices can be defined as ‘aggregated measures that combine indicators most important to describe the performance of an institution, region or economic sector’<sup>2</sup>. In general, an index can itself be used as an indicator, one that simplifies the complex information contained in all of the index’s constituent parts. For example, GDP per capita is an indicator. The Human Development Index, which aggregates GDP per capita, life expectancy at birth, and school enrolment, is an index.

### 3.5 Human Development Indices

UNDP has, over the years, developed a set of composite indices to assess different aspects of human development. These are, for example: the human development index (HDI), the gender-related development index (GDI), the gender empowerment measure (GEM), the human poverty index (HPI), and the technological achievement index (TAI). Although this set of indices is not able to cover all the dimensions of human development, it nevertheless offers a good alternative to the use of income, or other single indicators, as a measure of overall human well-being (UNDP 2004). Here we briefly review some of the above listed indices that show more potential to assess the human impact of PAs.

#### *Human Development Index*

The human development index (HDI) is a composite index that measures the average achievements of a country towards human development on the base of three basic dimensions of human development:

1. a long and healthy life, as measured by life expectancy at birth
2. knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary and tertiary gross enrolment ratio (with one-third weight)
3. a decent standard of living, as measured by GDP per capita in purchasing power parity (PPP) US dollars

#### *The Human Poverty Index*

The human poverty index (HPI) focuses on the proportion of people below a threshold level in basic dimensions of human development. The human poverty index for developing countries (HPI-1) uses different variables than the index for high-income OECD countries (HPI-2) (UNDP 2004).

#### 1. The human poverty index for developing countries (HPI-1)

While the HDI measures achievements, the HPI-1 measures *deprivations* in the three basic dimensions of human development captured by the HDI:

- vulnerability to death at a relatively early age, as measured by the probability at birth of not surviving to age 40
- exclusion from the world of reading and communications, as measured by the adult illiteracy rate
- lack of access to overall economic provisioning, as measured by the unweighted average of two indicators, the percentage of the population without sustainable access to an improved water source and the percentage of children under weight for age

#### 2. The human poverty index for selected OECD countries (HPI-2)

The HPI-2 measures *deprivations* in the same dimensions as the HPI-1 and also captures social exclusion. Thus it reflects deprivations in four dimensions:

- vulnerability to death at a relatively early age, as measured by the probability at birth of not surviving to age 60
- exclusion from the world of reading and communications, as measured by the percentage of adults (aged 16–65) lacking functional literacy skills
- a decent standard of living—as measured by the percentage of people living below the income poverty line (50% of the median adjusted household disposable income)

<sup>2</sup> International Institute for Sustainable Development. 2002. *Measurement and Indicators for Sustainable Development* ([www.iisd.ca/measure/faqindicator.htm](http://www.iisd.ca/measure/faqindicator.htm))

- social exclusion - as measured by the rate of long-term unemployment (12 months or more).

#### *The Gender-Related Development Index (GDI)*

While the HDI measures average achievement, the GDI adjusts the average achievement to reflect the *inequalities* between men and women in the following dimensions (UNDP 2004):

- a long and healthy life, as measured by life expectancy at birth
- knowledge, as measured by the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio
- a decent standard of living, as measured by estimated earned income (PPP US\$)

### **3.6 Other Indices**

The indices developed by UNDP and described above are amongst the most well known and commonly used indices to measure human development. Many other indices have nevertheless been developed by various organisations to assess the state of environmental and socio-economic conditions at the national, regional and country level.

#### *Environmental Sustainability Index*

The Environmental Sustainability Index (ESI) is a composite index developed by CIESIN based on 76 variables, organised in 21 indicators of environmental sustainability covering natural resource endowments, past and present pollution levels, environmental management efforts, contributions to protection of the global commons, and a society's capacity to improve its environmental performance over time. The ESI provides a powerful environmental decision-making tool tracking national environmental performance and facilitating comparative policy analysis. However, to calculate its ESI a country must have data available for at least 60% of the 76 variables, which is not easy, especially for developing countries (Esty *et al* 2005, PEP 2005).

#### *Environmental Performance Index*

The pilot Environmental Performance Index (EPI) is an index recently developed by CIESIN that focuses on two broad environmental protection objectives: reducing environmental stresses on human health and protecting ecosystem vitality. By identifying specific targets for environmental performance and measuring how close each country comes to these established goals, the Pilot 2006 Environmental Performance Index (EPI) provides standards for current national pollution control and natural resource management results. This index thus facilitates cross-country comparisons, both globally and within relevant peer groups, and provides a powerful tool for improving environmental decision-making (Esty *et al* 2006).

#### *Ecological Footprint*

The Ecological Footprint (EF) is a measure of environmental sustainability developed in the early 1990s by Reese and Wackernagel. The EF depicts the amount of land and water area a human population would hypothetically need to provide the resources required to support itself and to absorb its wastes, given prevailing technology. The final measure is given in 'global hectares' (gha) per capita. The EF can be estimated at the local, national, regional and global level. Conservation organisations are usually keen on the use of the EF, as it provides information on environmental sustainability in a way that is easy to understand by non specialists. However, specialists tend to criticise this measure on account of the many simplifying assumptions it is based on (PEP 2005).

#### *Adjusted Net Savings*

Adjusted Net Savings, which was developed by the World Bank, is intended to be a measure of sustainable development. This measure is calculated by adjusting gross national savings for natural resource depletion, pollution, and social investments. The final result can be presented as a dollar amount, or as a percentage of the gross national income (GNI). The Adjusted Net Savings has the advantage of being easy to calculate; on the other hand, critical measures of poverty, governance and natural resources are omitted and therefore the results can be misleading (PEP 2005).

#### *Measure of Comprehensive Wealth*

Another measure of sustainable development proposed by the World Bank is the so called Measure of Comprehensive Wealth. This measure is based on the assumption that a country's total wealth depends on the value of its natural resources, the value of its infrastructure, and the value of its intangible wealth (i.e. knowledge and institutions). Although this approach provides a useful measure, it also has many shortcomings. For example, it does not include all important natural resources (PEP 2005).

### **3.7 Conclusions on Socio-Economic and Environmental Indices**

The Human Development Index is one of the best way currently available to give an indication of the overall human well-being of a population with a single number. This strength of this index is that it is constructed using indicators that are available globally, and a methodology that is simple and transparent. Given its characteristics, the HDI could be very useful also in the field of assessing the impacts that PAs have on people. However, a few considerations should be made on the advantages and disadvantages of this index.

To start with, a country's overall HDI can conceal the fact that different groups within the country have very different levels of human development. Using disaggregated HDIs at the national and sub-national levels helps highlight the significant disparities and gaps among regions, between the sexes, between urban and rural areas and among ethnic groups. Another way to enrich the information supplied by the HDI is to combine it with the information provided by other indices, like the Gender-Related Development Index.

Secondly, while the HDI is an important tool to compare country achievements across all levels of human development, it is difficult to use the HDI to monitor changes in human development in the short-term because two of its components, that is life expectancy and adult literacy, change slowly.

Finally, the indicators currently used in the HDI yield very small differences among the countries with the highest HDIs, and thus the top of the HDI rankings often reflects only the very small differences in these underlying indicators. For these high-income countries an alternative index - the human poverty index - can better reflect the extent of human deprivation that still exists among populations (UNDP 2004). The HPI can be used as a planning instrument for identifying areas of concentrated poverty within a country. However, like the HDI, the HPI could be enriched and made more robust when a wider range of data on different aspects of poverty and human development are available.

The other indices described above (ESI, EPI, EF, Adjusted Net Savings, Measure of Comprehensive Wealth) provide a good indication of the state of the environment and of the well-being of people, but their focus is more at the national, regional and global level than at the local level, which is the most important when exploring the impact of PAs on people. However, these indicators are significant as they prove the extensive effort spent by conservation and development organisations in recent years for the development of more comprehensive and improved indices.

For a more comprehensive list of socio-economic indicators see Appendix A.

## **4. Poverty-Environment Indicators**

The last few years have witnessed the production of a wealth of studies aimed at developing and implementing poverty-environment indicators. These studies were motivated by the recognition that, while the international community has been advocating, in its many fora, the necessity of pursuing simultaneously conservation and poverty reduction objectives, and while numerous indicators have been developed to assess either the state of the environment or the state of human well being, there is a general lack of indicators able to capture the relationship linking poverty and the environment. This section of the report reviews some of these studies.

### **4.1 What Are ‘Poverty-Environment Indicators’?**

The only study, among the ones reviewed here, that gives an explicit definition of poverty-environment indicators is Shyamsundar’s, according to which a poverty-environment indicator is ‘one which changes when better management of natural resources leads to a decline in poverty (broadly defined)’ (Shyamsundar 2002:15). Though useful, this definition is quite restrictive.

For the aim of the present research, it is more helpful to define poverty-environment indicators in a more comprehensive way, as indicators that measure an aspect of the relationship between poverty and the environment.

### **4.2 A Review of Studies on Poverty-Environment Indicators**

- In 2002 DFID carried out a study aimed at developing a set of generic poverty-environment indicators for potential use in Poverty Reduction Strategy Papers (PRSPs). The development of indicators in this study was based on the identification of environmental issues of relevance to the poor, through PPAs and other sources of information, and on the review of relevant indicator initiatives carried out by other organisations. The result of this study was the production of a set of generic poverty-environment indicators that were later pilot tested in a few countries. The conclusions that could be drawn from this testing phase were that the set of generic indicators selected by this study are indeed representatives of all environmental issues relevant to the poor, however additional refinement at country level can make the indicators more specific and less ambiguous. Furthermore, any set of indicators will always be a compromise between what we want to evaluate and the ability to collect appropriate data (Nunan *et al* 2002).
- A well known study, entitled ‘Poverty-Environment Indicators’ (Shyamsundar 2002), was published by the World Bank in 2002. This study was carried out with the goal of identifying indicators that could be used to assess poverty-environment interactions. More specifically, recognising the complexity of the relationship between poverty and the environment, this study chose to address only one of its dimensions, that is how environmental factors impact the health and wealth of the poor. Based on the review of existing literature and past experiences, this study identified a key set of indicators that can be used to monitor the effects of environmental factors on health and poverty. The list of indicators provided by this study should not be considered exhaustive, nor should all the indicators listed necessarily be monitored for each project. The set of indicators to be used for a specific situation should be chosen according to criteria like: local conditions, data availability, cost effectiveness, etc.
- WWF Macroeconomics Programme Office has developed an approach aimed at analysing the impact of macroeconomic and institutional reforms on the environment and on the rural poor. WWF’s study aimed at identifying a specific set of indicators for each situation under analysis, rather than a generic set of indicators, like DFID’s and World Bank’s studies. To this end, WWF’s study first identifies a number of indicators and classifies them according to three different categories of poverty-environment indicators: status indicators, enabling conditions indicators, and social capital indicators.

The WWF-MPO's approach then recommends to choose, among these indicators, the most appropriate set of poverty-environment indicators for the specific situation under analysis, and to integrate the quantitative information obtained by the implementation of these indicators with the information derived from qualitative assessments (Reed and Tharakan 2004).

- In 2002 the World Bank commissioned to WRI a paper on spatially referenced poverty-environment indicators that could be used to target poverty reduction programs and to monitor their outcomes. The authors of this study concluded that more poverty-environment indicators should be developed and implemented, since they have a great potential to improve our understanding of the relationship between poverty and the environment. However, to be truly useful these indicators should be disaggregated, as national level indicators do not provide sufficient information to understand how poverty and environmental conditions interact, and have a geographic framework, since many environmental and poverty issues manifest themselves spatially (Henninger and Hammond 2002).

### 4.3 A Set of Poverty-Environment Indicators

Based on a review of past studies and experiences (Henninger and Hammond 2002, Nunan *et al* 2002, Poverty Environment Partnership 2005, Reed and Tharakan 2004, Shyamsundar 2002) we can identify the indicators in table 4.1 as the key poverty-environment indicators that could be used in a study aimed at assessing the human impact of PAs. Not all of these indicators should necessarily be used in every situation.

Table 4.1 A Set of Poverty-Environment Indicators

| Poverty-environment indicator   | Potential data sources  |
|---|---|
| <b>Food security and ownership of or access to land</b>   |   |
| Proportion of the poor with secure use rights to land for farming   | - National Legislation  |
| Percentage of poor farmers with access to x hectares to grow food for household consumption                   | - PPA   |
| Percentage of child caregivers and food prepares with appropriate hand washing behaviour                      | - Surveys   |
| <b>Power and voice</b>  |   |
| Area of forests co-managed by user groups with representatives of the poor                                    | - National ministries and statistical bureaux   |
| Access to sanitation facilities by women  | - National ministries and statistical bureaux<br>- PPA  |
| <b>Water security</b>   |   |
| Access to safe water (private or public)  | - MICS<br>- DHS<br>- WDI  |
| Hours spent per day collecting water by women and children living in rural areas (noting seasonal variations) | - UNICEF multiple indicator cluster survey data<br>- National ministries and statistical bureaux<br>- PPA |
| Percentage of household income spent on water in urban areas  | - PPA   |
| <b>Agricultural productivity</b>  |   |
| Percentage of poor farmers with access to sustainable irrigation facilities                                   | - National ministries and statistical bureaux<br>- PPA  |
| Per capita rural cereal production  | DHS<br>Surveys  |

|  |   |
|--|---|
| <b>Substandard housing</b>   |   |
| Percentage of people living in substandard housing (rural and urban figures)   | - Government department with responsibility for housing                                       |
| Density of housing in urban areas  | - Government department with responsibility for housing                                       |
| <b>Poverty</b>   |   |
| Percent of rural population below the poverty line   | - WDI   |
| Percent of rural children under 5 who are underweight  | - DHS<br>- Surveys  |
| Percent of rural children under 5 who are stunted  | - DHS<br>- Surveys  |
| Percent of rural children under 5 who are wasted   | - DHS<br>- Surveys  |
| <b>Substandard housing</b>   |   |
| Infant mortality rate  | - MICS<br>- DHS<br>- WDI  |
| Under 5 mortality rate   | - MICS<br>- DHS<br>- WDI  |
| Prevalence of diarrhoea  | - DHS   |
| Prevalence of acute respiratory infection  | - DHS   |
| Malaria death rate   | - DHS<br>- DSS<br>- Health facility surveys   |
| Proportion of health burden of the poor related to environmental factors – disease incidence related to environmental factors disaggregated by age (e.g. vulnerability of children under 5)  | - National ministries and statistical bureaux<br>- WHO<br>- World Development Indicators      |
| <b>Living in environmentally fragile areas, such as arid and tropical lands with limited soil fertility</b>  |   |
| Proportion of the poor living in ecological fragile areas  | - National ministries and statistical bureaux<br>- PPA  |
| Proportion of the poor living in ecologically fragile areas whose main source of livelihood is agriculture (either subsistence, agriculture, or farm labouring?)<br>Access to non-farm sources of livelihood for the poor living in ecologically fragile areas | - National ministries and statistical bureaux<br>- PPA  |
| <b>Access to common property resources by women, especially water, fuelwood and NTFPs</b>  |   |
| Hours spent per day/week collecting fuelwood by women and children in rural areas  | - UNICEF multiple indicator cluster<br>- National ministries and statistical bureaux<br>- PPA |
| Percentage of household income spent on fuel in urban areas  | - UNICEF multiple indicator cluster<br>- National ministries and statistical bureaux<br>- PPA |
| Percentage of common property land available to women for collecting fuelwood and non-timber products  | - UNICEF multiple indicator cluster<br>- National ministries and statistical bureaux<br>- PPA |
| Percentage of poor fisherfolks with access to adequate fish catches  | - UNICEF multiple indicator cluster<br>- National ministries and statistical bureaux<br>- PPA |
| <b>Natural disasters</b>   |   |
| Percentage of the population living in areas prone to flooding   | - Government department with responsibility for flood control and disasters                   |
| Number of poor people killed by environmentally related disasters  | - Government department with responsibility for flood control and disasters                   |



|  |   |
|--|---|
| Number of poor people made homeless by environmentally related disasters | - Government department with responsibility for flood control and disasters |
|--|---|

MICS: Multiple Indicator Cluster Survey, supported by UNICEF and carried out by national governments

DHS: Demographic and Health Surveys, supported by USAID and carried out by Macro International

WDI: World Development Indicators, World Bank

DSS: Demographic Surveillance Systems

## 4.4 Conclusions

Having reviewed some of the key studies on poverty-environment indicators, a few conclusions can be drawn on the potential advantages of using poverty-environment indicators to assess the human impact of protected areas.

First of all, the development and implementation of poverty-environment indicators poses numerous challenges because of:

- the usually broad interpretation we give of both concepts of poverty and environment;
- the complexity of the relationship between poverty and the environment;
- the general lack of environmental data.

The relationship between poverty and the environment is very complex. Poverty-environment indicators are a better tool to address this complexity, compared to just poverty indicators, or environment indicators. However, the problem of capturing the complexity of this relationship is not solved by using poverty-environment indicators. Moreover, given the complexity of the relationship linking poverty and the environment, care is always needed in the interpretation of the information provided by poverty-environment indicators. To address the problem of how to interpret the information provided by these indicators, a World Bank's study (Shyamsundar 2002) suggests the use of the pressure-state-poverty-response (PSPR) framework. The PSPR framework, a modified version of OECD's pressure-state-response (PSR) model, helps to identify the most appropriate indicators for the understanding of each specific situation, and to interpret the information provided by the indicators themselves, by allowing us to track the impact of pressure factors not only on natural resources, but also on the poor.

Many studies suggest that a different set of poverty-environment indicators might be needed to capture the issues related to the linkages between poverty alleviation and biodiversity conservation in each local situation. The choice of indicators to be used in a specific situation depends on many factors like: local conditions, availability of data, cost effectiveness, etc.

Local and geographically referenced poverty-environment indicators can be used to develop poverty maps and maps of natural resource availability. These maps, when combined, provide a powerful tool to explore the poverty-environment linkages, even though extra care should be put in the interpretation of the information provided by these maps. Poverty maps will be discussed in more details in the following chapter.

In conclusion, many researchers agree that poverty-environment indicators have the potential to significantly improve our understanding of the relationship existing between poverty and the environment. However, great care must be used when implementing these indicators and in the interpretation of the results provided by them.

For more information about the studies reviewed in this section see Appendix B.

## 5. Poverty Mapping

Poverty mapping, which can be defined as ‘the spatial representation and analysis of indicators of human well being and poverty’, is becoming an increasingly important tool for governments, donors, and NGOs to improve targeting of public expenditure, to implement development interventions, and in emergency response (Henninger and Snel 2002). This chapter aims to briefly analyse how poverty maps can be created, how they have been used so far, and their potential advantages and disadvantages as a tool to assess the impact of protected areas on people.

### 5.1 Creating Poverty Maps

A fairly thorough description of the steps involved in generating poverty maps is offered by Henninger and Snel (2002):

1. Define purpose and expected use of the poverty map: this should always be the first step as it determines the required resolution of the final map and how to carry out the mapping exercise.
2. Select measures of poverty and human well-being: choosing an indicator of poverty is a critical step, as the choice of indicator will ultimately influence who is classified as poor. The indicator could be economic (e.g. proportion of households below a poverty line), or could cover other aspects of human well being.
3. Select input data: the most common sources of data for poverty mapping are population censuses, household surveys and GIS databases. Additional sources of information for poverty maps are administrative data, auxiliary data sources, and aggregate indicators. It should be noted that data may vary in coverage (which can be comprehensive or partial), collection method (qualitative vs. quantitative approaches, top-down vs. participatory approaches) and resolution (from household level to administrative units).
4. Select method of estimating or calculating poverty indicator: researchers can choose to estimate a single variable (e.g. per capita household expenditure compared to a poverty line), or they can use a composite index (e.g. HDI).
5. Select a method to calculate, estimate or display poverty indicator for geographic area: Poverty maps can be generated simply by mapping census or survey data. More often, techniques are used to estimate the value of an indicator for a geographic area.
6. Decide on a number of units for the final map (resolution) to present poverty data: this step is often linked with the previous one. Analyses carried out so far suggest that, in general, a minimum of 5000 households is needed to reduce statistical error at an acceptable level.
7. Produce and distribute maps: maps and the relative analysis must be distributed to the targeted audience.
8. Monitor usage and feedbacks: in order to improve poverty mapping, researchers should monitor the different ways in which their maps are being used and by whom, while users should provide feedbacks on the usefulness and/or limitations of the poverty maps.

A few more words need to be spent on point 5 of the above list (select a method to calculate, estimate or display poverty indicator for geographic area). At the moment, there is no standard methodology for producing high resolution poverty maps, which are the most interesting for researchers working on topics that have an important locational aspect, like distribution of ecosystem goods and services, biodiversity hotspots, etc.. Nevertheless, a commonly used method to estimate the value of an indicator for a geographic area is the ‘small area estimation’.

The small area estimation approach requires determining the relationship between an indicator studied in an household survey, and one of the variables found in a national census. Once this relationship has been identified, the analyst can use it to map the survey's welfare indicator onto the detailed geography offered by a national census (Deichmann 1999). This method is quite complex, as it involves the use of advanced statistical methods combined with econometrics techniques, however it allows to combine census data, with household survey data, thus benefiting from both the complete country coverage of the census, and the relevant poverty indicator in the household survey.

The use of the small area estimation technique to create poverty maps has become a lot more widespread in recent years, thanks to advancements in econometric and statistical methods. Another progress that has contributed to the production of poverty maps is the development of the GIS. Geographic information systems (GIS) are software programs designed to handle geographically referenced data. Essentially, GIS are database management systems that use spatial coordinates as a reference for each database record. Through GIS, data can easily be displayed on a map and can be combined with other data available for the same geographic location to analyse social, economic and spatial relationships (Bigman and Fofack 2000).

## 5.2 Examples of Initiatives Aimed at Mapping Human Welfare and Poverty

In the last decade, several governmental and non governmental organisations have carried out very important work on mapping poverty related indicators and exploring their links with environmental factors. A well known initiative, for example, is the 'Poverty Mapping Project' implemented as a joint initiative by FAO, UNEP and CGIAR. This project, which ran from 2001 to 2004, aimed to:

- analyse and map the spatial distribution of poverty;
- produce and promote the use of poverty maps and show linkages between poverty and food insecurity, the environment and development;
- promote the use of poverty maps in policy making and targeting assistance.

Numerous maps, graphics and publication have been produced in the course of this project and are now available for consultation on the project's website (<http://www.povertymap.net>).

Another example of how poverty mapping can be used to study the relationship between poverty and the environment is provided by UNEP-WCMC and its project 'Forest and Poverty Mapping in South Asia'. The aim of this project, carried out between 1999 and 2000, was to map indicators of poverty and population pressure, and to combine this information with maps of forest cover, protected areas, biodiversity hotspots etc. The maps thus developed can be a very useful tool for decision makers who want to identify priority areas for action for the development of the forestry sector<sup>3</sup>.

Relevant poverty-environment mapping efforts were also reviewed during the 3<sup>rd</sup> IUCN World Conservation Congress (Katariya *et al* 2005):

### *WRI – Mapping ecosystem services and poverty in Kenya*

This project aimed at improving the effectiveness of poverty reduction efforts, empowering civil society groups and increasing the use of environmental information in poverty reduction interventions. In order to achieve these goals, high resolution maps of the percentage of the population below the poverty line (using new reliable poverty estimates for Kenya and Uganda) were generated and then combined with maps of ecosystem services (e.g. food from crops, fish or livestock), to obtain maps of ecosystems disservices (e.g. intersecting poverty with elephant conflict areas).

### *UNDP – Mapping ecosystem services and poverty in Rwanda*

The objective of this project was to link poverty indicators with indicators of natural resources to improve our understanding of the poverty-environment nexus in Rwanda and contribute to providing policy makers with the information they need to generate sound development strategies. The methodology included identification of key poverty-environment relationships. Review of information sources and integration of data. This case study is part of UNDP's effort

<sup>3</sup> (more information about this project can be found at: <http://www.unep-wcmc.org/forest/poverty/index.htm>, last accessed 12 December 2006)

to use poverty-environment maps to support UNDP's work on sustainable livelihoods and the MDGs.

*Conservation International (CI) – Focusing on biodiversity conservation and supporting poverty reduction*

The goal of this project was to identify places of particular ecological value that could benefit the most from development interventions. To do this, an analysis was carried out at the hot spot level by combining indicators of poverty, population density, etc. and then assigning them a ranking score. In this way it was possible to identify areas where investment was more needed.

*Asia Development Bank (ADB) – Poverty-environment decision support system*

ADB has developed an information system called Map View which aims to integrate into one application environmental and social information with GIS layers and remote sensing images. The main objective of this effort is to create a database which facilitates access and sharing of data in order to support decision-making.

*IUCN – Species Information Service (SIS)*

IUCN's Species Information Service is a Biodiversity Conservation Information System which aims to link biological, legal, economic and possible other types of information in order to support sound decision-making. The main strengths of SIS are that it links species and habitats to ecosystems, it makes information readily available to a variety of users, and that it allows analyses at different geographical scales.

### 5.3 CIESIN Global Poverty Mapping Project

CIESIN (Center for International Earth Science Information Network) recently launched an initiative called 'Global Poverty Mapping Project' which has two main objectives: 1) improve our knowledge of the global distribution of poverty and our understanding of the relationship between poverty and geographic factors; 2) support sound decision-making in the design of interventions aimed at reducing poverty.

Though only recently launched, this initiative has already delivered a number of results:

- using data drawn from Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and Human Development Reports (HDRs), CIESIN has built global datasets of poverty using infant mortality and child malnutrition data, which are proxies for human well being;
- spatial analysis approaches have been used in a number of countries (i.e. Mexico, Ecuador, Kenya, Malawi, Bangladesh, Sri Lanka and Vietnam) to examine the relationship between poverty and geographic factors, and to generate food security and welfare estimates for sub national areas;
- poverty rates have been mapped for Madagascar, Bolivia, Viet Nam, Ecuador, Kenya, Bangladesh, South Africa.

However, for the objectives of the present research, the most interesting mapping effort carried out so far by CIESIN is the one described by Alex de Sherbinin in the currently unpublished paper 'Protected Areas and Poverty: Selected Descriptive Statistics'. In this paper, de Sherbinin illustrates the methods used, and the results achieved by a study aimed at combining a global map of infant mortality rates with a sample of the world's PAs, in order to generate some descriptive statistics on poverty levels by PA category, size and establishment date (de Sherbinin 2006).

Infant mortality rate (IMR), which measure infant death per 1000 live birth and which is a valuable proxy of poverty levels, was adopted as an indicator of well being. A global gridded map of IMRs was developed by CIESIN, and was then overlapped to the information on PAs derived by the national IUCN category I-VI points database of the 2006 WDPA. After the necessary adjustments, the data thus combined were exported to a statistical software and analysed. A few descriptive statistics were identified:

- IMRs were lower than the global average, probably reflecting the fact that the majority of the PAs are in developing countries;
- IMRs vary significantly depending on the IUCN category PAs belong to;

- IMRs tend to be lower in larger PAs, probably suggesting that larger PAs are located in developing countries;
- IMRs are on average higher in recently established PAs, probably reflecting the fact that the vast majority of PAs established in the past were established in developing countries.

In conclusion, the predictive power of this analysis is heavily limited by the relative coarse scale at which IMR data are available. More generally, it is important to note that simply highlighting a correlation between poverty levels and protected areas is not sufficient to draw conclusions on the causal relationship between the two. Nevertheless, acquiring information on poverty levels for the various protected areas can help identify those protected areas that are more in need of development interventions.

### 5.3 Conclusions

From this brief analysis, we can conclude that poverty mapping has numerous potential advantages as a tool to assess the impact of protected areas on people:

- it allows to integrate biophysical information with socio-economic indicators, to obtain a more comprehensive picture of human well being (Henninger and Snel 2002);
- it allows to display simultaneously different factors on the same map (Deichmann 1999);
- it uncovers the geographic variations in the incidence of poverty (or any other factor under consideration) within a country, which are often hindered by aggregate national level indicators (Deichmann 1999);
- maps are a powerful visual tool for communicating information to a non-specialist audience, like politicians, decision makers and the local community (Henninger and Snel 2002);
- internationally comparable poverty maps can improve strategic planning of international development organisations (Henninger 1998);
- digital maps are a useful way for storing information (Snel 2004).

In addition, the potential of poverty mapping has greatly improved in recent years, thanks to numerous factors:

- household surveys are carried out more frequently;
- many initiatives have been implemented with the aim of providing better data for poverty mapping (e.g. IFAD has produced national level poverty indicators and prepared a descriptive table on the location of the rural poor in 56 countries; UNDP has calculated composite indicators (HDI, HPI, etc) at sub national level for selected countries; WB has completed poverty assessments for 35 countries and disaggregated data are provided by urban and rural characteristics and by broad geographic regions);
- the computing technology that supports mapping efforts has become significantly more powerful, while at the same time simpler to use (CIESIN 2006);
- advanced statistical techniques have become available, which enable a more sophisticated manipulation of the data (CIESIN 2006);
- advanced econometrics techniques have been developed, which allow the estimation of poverty indicators at a high spatial resolution (CIESIN 2006).

However, poverty mapping still presents a number of limits:

- very few developing countries collect data that can be used to reliably map poverty, especially at the sub-national level (Henninger 1998);
- methods and applied scales vary from country to country, which makes it difficult to integrate and compare national poverty maps to generate an international view;
- generating maps is time consuming and expensive (Snel 2004);
- there are cultural differences in the way people understand the information provided by maps (Snel 2004);

We conclude this chapter with a word of caution: knowing where the poor live does not explain why they are poor. Poverty maps allow to identify spatial patterns which can provide new insights into the causes of poverty (Henninger 1998), however care is always needed in drawing conclusions, especially on causal relationships.

For more information about poverty mapping see Appendix C.

## 6. Participatory Approaches

The previous sections of this report have analysed ‘top-down’ approaches to the issue of assessing the human impact of protected areas. We refer to those as ‘top-down’ approaches because they are all based on the use of indicators chosen *a priori*, from researchers or decision-makers, as the most appropriate indicators to evaluate a given situation. In this section, we review a group of approaches that can be defined as ‘participatory’ or ‘bottom-up’ approaches. What these methods have in common is that, instead of drawing on a set of pre-identified indicators, they use participatory techniques to isolate indicators and/or collect information that is relevant to local people and appropriate for the specific situation under evaluation.

### 6.1 A Framework to Monitor the Contribution of BirdLife’s Work to Poverty Alleviation

During the past few years BirdLife has worked towards developing a framework to monitor the contribution that its conservation work in Important Bird Areas (IBAs) has on human well being. The framework has been developed on the base of the following main considerations:

- the indicators used to evaluate the human impact of conservation projects should be developed locally using participatory techniques, as this is the only way to ensure that what is being measured is relevant to local people;
- while indicators should be developed locally, it should be possible to aggregate them at the national, regional and global level;
- time, effort, and cost are important variables.

On the base of these considerations, BirdLife has developed a framework characterised by the following main phases: first, PPA (Participatory Poverty Assessment) are used to identify poverty indicators relevant to local people; second, the poverty indicators thus identified are grouped under a set of composite ‘indicator classes’; finally, the composite indicators are classified under one of the OECD DAC core dimensions of poverty (economic, human, political, socio-cultural, and protective capabilities) (BirdLife International 2006, Fanshawe and Thomas 2005a, Fanshawe and Thomas 2005b).

### 6.2 A Conceptual Framework to Assess the Livelihoods and Biodiversity Impacts of Conservation Activities at the Landscape Level

Researchers from IUCN, WWF, and CIFOR have jointly produced a framework aimed at assessing the livelihoods and biodiversity outcomes of conservation activities at the landscape level. This framework is based on the use of participatory techniques to isolate approximately five indicators for each of the five capital assets identified by the capital assets framework: human, social, built, financial, and local natural assets. The indicators thus identified are then refined until a set of 25-30 indicators is obtained. Finally, a numeric value is assigned to every indicator with the use of a Linkert scale. The results of this assessment can be represented using radar diagrams, which have the advantage of showing changes in situations without necessarily implying a judgement on whether these changes are good or bad (Sayer *et al* 2006a, Sayer *et al* 2006b).

### 6.3 Assessing the Effects on Human Well being of Establishing Protected Areas to Conserve Biodiversity

David Wilkie, together with colleagues from the Wildlife Conservation Society (WCS) and from other organisations, has been involved in the last few years in a study aimed at assessing the human welfare effects of establishing protected areas for biodiversity conservation. This group of researchers has produced a set of guidelines of what should be measured and of how data should be collected when conducting a study of this type. More specifically, they identify health, wealth, income, consumption and access to services as the most important attributes of human

welfare to track. They then suggest that data on these factors should be gathered both at the household and village level through a mixture of participatory mapping, survey methods, remote sensing image analysis, and direct observation. Finally, they suggest that: first, to obtain meaningful results, data should be collected for the same families before and after (1, 3, 5, 10 years) the establishment of the park or reserve; second, data should be gathered both on families that were affected by the establishment of a park and on 'control' families that were unaffected. Control households should match park-influenced households in all their basic characteristics (Wildlife Conservation Society 2006, Wilkie *et al* 2006).

#### **6.4 Assessing the Socio-Economic Status of People Living Near Protected Areas in the Central Albertine Rift**

In 2002 WCS, IGCP, and CARE International joined forces to carry out a study aimed at providing a baseline assessment of the socio-economic conditions of the people living in the central Albertine Rift. Participatory techniques were used to decide on the most appropriate method to conduct the assessment. After a series of meetings, it was eventually decided that questionnaire surveys, conducted using a PRA approach, were the best way to collect information on the socio-economic situation of people living in the central Albertine Rift. Participatory techniques were used also in the preparation of the survey (Plumptre *et al* 2004).

This study is different from the others analysed in this section since it aimed to assess a baseline condition, and not changes in a situation. It is however interesting because it proves that questionnaires, especially when developed and implemented in a participatory way, are a good way of assessing the socio-economic status of people living in and around PAs.

#### **6.5 Applying the Sustainable Livelihoods Approach to Assess the Impacts of Wildlife Enterprises**

In 1997 AWF launched a project, called WELD, aimed at assessing the effectiveness of wildlife enterprises as a conservation and development tool. In order to achieve this goal, AWF, together with others, developed a new methodology for assessing economic and livelihoods impact of wildlife enterprises based on the sustainable livelihoods framework used by DFID. The sustainable livelihood assessment methodology developed by AWF involves three key components:

1. key themes to explore (current livelihoods strategies and achievements, how livelihoods strategies and achievements are affected by the project, differences between stakeholders groups);
2. methods for collecting the data (literary review, surveys, participatory techniques);
3. analysis of the results from a livelihood perspective .

Compared to conventional approaches, the sustainable livelihoods framework has the advantage of highlighting a broader range of livelihood components against which project impact can be assessed. However, it tends to provide qualitative, rather than quantitative results, therefore the findings are rarely comparable (Ashley and Hussein 2000, Ashley *et al* 1999).

#### **6.6 Assessment of Protected Areas Costs and Benefits**

Care International is engaged, together with IUCN and AWF, in an ongoing project aimed at promoting greater social equity in the conservation of PAs. To achieve their goal, the researchers and practitioners involved in this project have developed a methodology aimed at assessing the costs at global, national and local levels of a range of different types of PAs. The methodology developed within this project is based on the use of two complementary methods:

- *Rapid social impact assessment (RSIA)*: used to identify the costs and benefits of PAs on local communities
- *Economic analysis (EA)*: used to put a dollar value on the most significant costs and benefits of PAs at the local, national and global level.

The analysis aims to take place at four different levels:

- At the *local level* the RSIA (based on the sustainable livelihoods framework) will be used to identify effects of the PA that local people feel generate costs and/or benefits at the community and/or household level, and the significance of these different effects in terms of positive or negative impacts on the well being of their households.
- At the *PA level* a financial analysis is carried out to assess all costs and incomes derived from the PA.
- At the *national level* the assessment aims to estimate the total economic value of the PA to the national economy focusing on direct and indirect values. This assessment will be based, as far as possible, on secondary sources.
- At the *global level* the assessment aims to estimate the total economic value of the PA to people outside the country in which the PA is located. This assessment will be based entirely on secondary sources.

## 6.6 Conclusions

In the previous paragraphs we have briefly analysed some participatory approaches developed to assess the impacts of conservation activities on human well being. On the base of this analyses we can draw some conclusions on the advantageousness of this type of approaches to assess the human impact of protected areas.

The use of participatory techniques to identify and measure poverty indicators, and to collect qualitative information, has many advantages: it ensures that what is measured is really relevant to local people; it increases the explanatory power of indicators, as they are more directly linked to the local context; finally, it contributes to empowering local people. On the other hand, the implementation of participatory techniques is expensive, requires the use of additional staff and can be very lengthy. Time, effort, and cost are all important variables to keep in mind when developing an evaluation framework, especially if the framework is to be applied to a large number of sites (Fanshawe and Thomas 2005a, Fanshawe and Thomas 2005b).

Indicators developed locally are more meaningful, however, when dealing with this type of indicators it is more difficult to make comparisons at the local, national, regional or global level. There are two main reasons for this: first, many factors influence the outcomes of a participatory process (e.g. cultural context, facilitators' expertise, specific type of participatory techniques implemented, etc.); second, each local situation generates a different set of indicators. BirdLife's framework offers a solution to the second of these problems. According to this framework all indicators identified at the local level are grouped under a set of 12-20 composite indicators, which can be used to make comparisons. These are in turn classified under one of the five OECD DAC core dimensions of poverty. Moreover, if all indicators identified locally are expressed in terms of number of people per households, then their value can be easily summed within each category and subsequently compared. Another possibility, which is the one adopted by IUCN, WWF and CIFOR's framework, is to use the Linkert scale to assign a numeric value to each indicator (Fanshawe and Thomas 2005a, Fanshawe and Thomas 2005b, Sayer *et al* 2006a).

The different approaches analysed above use different methods to identify indicators, however they all ultimately come up with a set of approximately 20-30 indicators. The conclusion we can draw from this is that 20-30 indicators are enough to capture all the relevant aspects of a situation, while still being manageable (Sayer *et al* 2006a).

To be more significant, a study should gather data for the same households located in or around a PA over time. In addition, data should be gathered, over the same period of time, for a group of 'control' households that, while being close to the park, are outside its area of influence (Wilkie *et al* 2006).

For more information about the studies reviewed in this section see Appendix D.



## 7. Other Relevant Initiatives

This last chapter aims to provide some more information on studies, projects and initiatives that are in some way related to the goal of the present research, that is, to identify methodologies that could be used to assess the human impact of protected areas. We start by presenting two conceptual models developed to assess the effects of conservation activities on biodiversity. We then review a series of projects which help us assess the state of the research on this topic, and to identify the organisations working in this field.

### 7.1 Conceptual Models

As a consequence of the increased accountability demanded by donor organisation to conservation organisations, the last decades have witnessed a sharp increase in the number of initiatives developed to assess the outcomes of conservation projects on biodiversity. The goal of the present research is to assess the impact of conservation activities on people, rather than nature, so these initiatives are not fully pertinent. However, some of these initiatives have generated conceptual models that are useful to understand how people have dealt with the problem of assessing the biodiversity impact of conservation activities, and might help us think about how to address the problem of assessing the impact of conservation activities on people. In addition, some of these models could potentially be adapted to evaluate the human impact of protected areas.

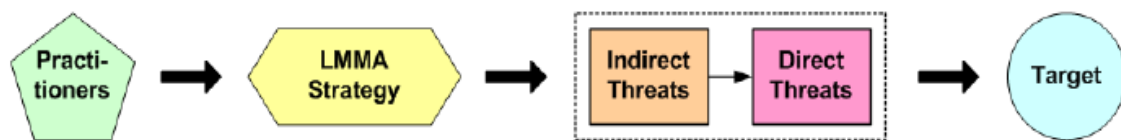
Before describing these initiatives in more details, it is useful to clarify what we mean by conceptual model. A conceptual model is a theoretical construct that represents something, with a set of variables and a set of logical and quantitative relationships between them. Conceptual models, which are generally flow-chart style representations of the generic processes, are built to enable reasoning within an idealized logical framework about these processes. In our context, conceptual models represent the processes by which different types of conservation activities can lead to conservation impact.

Two conceptual models are particularly interesting for the scope of the present research.

#### *General LMMA model*

This conceptual model was developed by the Locally-Managed Marine Area (LMMA) Network to understand the conditions under which a locally-managed marine area works best (Locally-Managed Marine Area 2003). The general LMMA model is shown in figure 7.1.

Figure 7.1 Components of the General LMMA Model



Source: Locally-Managed Marine Area 2003

This conceptual model identifies the following as the most important factors determining the success of a marine protected area:

1. Target – The condition that the project is focusing on and is trying to affect through its activities
2. Direct Threats – Factors that immediately affect the target
3. Indirect Threats – Factors that underlie or lead to the direct threats
4. Strategies – The actions being taken to address the threats and achieve the target
5. Practitioners – Individuals and organizations that have the skills and capacity to implement these strategies

6. Assumptions – Links between parts of a model showing how they affect one another. Assumptions are represented by arrows, and the direction of the arrow indicates the primary direction of causality

Even though this conceptual model was developed to assess how a LMMA strategy affects marine environmental health, it could potentially be adapted to assess how a protected area influence human well being. In this case the target would be human well being, and the LMMA strategy would be the type of protected area implemented.

#### *Harmonising measures of conservation success*

The Cambridge Conservation Forum (CCF) has developed a new approach to assess the success and impacts of conservation actions (Kapos *et al* 2006). The development of this approach involved the following main phases:

1. Identification of seven categories of conservation activities:
  - a. management of sites, habitats, landscapes and ecosystems
  - b. management of species and populations.
  - c. efforts to develop, adopt or implement policy or legislation
  - d. efforts to enhance and/or provide alternative livelihoods
  - e. training and capacity building
  - f. education and awareness-raising
  - g. research and conservation planning

These categories should cover all the main types of actions undertaken by conservation organisations. Many projects involve more than one type, and some all of the above.

2. Development of a conceptual, diagram-style, model of how a particular activity is used to generate conservation impact.
3. Development of a questionnaire-based tool, based on the conceptual models, that can be used for evaluating completed projects, and for planning and monitoring developing projects.
4. A fourth phase, which is currently under development, aims at identifying a scoring system for synthesising the responses to the questionnaire, and, ultimately, derive an overall success score for each project.

This approach is built with the clear aim of assessing the success of conservation activities. However, a similar approach could be developed to assess the human impact of protected areas. In particular, conceptual models could be developed to describe the relationship between conservation activities carried out in a protected area and their impact on people. These models could in turn be used as a base to develop a questionnaire to monitor the human impact of protected areas.

## **7.2 Further Studies, Initiatives and Potential Partners**

- In 2004 Dan Brockinton and Kai Schimdt-Soltau wrote a proposal for a project aimed at assessing the social impacts of PAs. The ultimate goal of the project was to create a web-based learning resource which would provide users with information about the social consequences of specific protected areas. The project was supposed to develop through two main phases: first, a baseline global assessment of the economic, social and cultural consequences of PAs, and the development of a framework that could be used to evaluate these; second, the application of this framework in particular parts of the world, to generate new information that could contribute to fill the gaps identified in the first stage. Due to a lack of funds, this project has never been implemented. It has, however, been very effective in raising attention on the issue of the social impacts of PAs (for more information: <http://www.social-impact-of-conservation.net>, accessed 17 December 2006).
- In 2004, DGIS (Directorate-General for International Cooperation) awarded Fauna and Flora International (FFI) a grant for a period of four years to undertake a project entitled 'FFI's Biodiversity and Human Needs Programme' (Walpole 2006, Walpole and Wilder 2006). This project aims at achieving two fundamental objectives relating to the mission of FFI:

1. strengthen the capacity of FFI and its partner agencies to deliver effective livelihood interventions which reduce both poverty and threats to biodiversity;
2. enable FFI to share successful experiences, both internally and with other organisations, and therefore to contribute more effectively to influencing international policy and practice.

A major component of this programme consists in performing socio-economic assessments at project sites to explore existing livelihoods strategies, participatory planning, and monitoring techniques. FFI has used a number of methodologies so far to conduct this assessment:

- a 'social risk assessment checklist' was sent to all project managers, at the beginning of the programme, to screen FFI's projects for potential social impacts. This checklist consisted of a very brief set of questions mainly aimed at making people reason about the possible human impacts of FFI's projects;
  - a protocol for monitoring and evaluation of projects, called 'standard reporting system', developed on the base of DFID sustainable livelihood framework, has been used at around 25-30 projects' sites. The first results of this monitoring programme will be available in 2007;
  - the so called 'most significant changes analysis', a method based on collecting stories of a specific change that people at projects sites have seen happening since the project was implemented, has been used at various projects' sites.
- The New South Wales National Parks and Wildlife Service (NPWS) Economics and Regulatory Reform Unit is engaged in a program of research aimed at assessing the economic and social benefits of protected areas for rural and regional communities. As part of this project, a number of individual studies of PAs (Christiansen and Conner 1999) have been carried out, which point out to the various benefits of PAs (e.g. income from sustainable tourism).
  - In 2002 the governments of Cambodia, Lao PDR, Thailand and Vietnam, together with a range of international donors and technical partners, undertook a review of protected areas and development in these four countries of the lower Mekong River region (ICEM 2003). This review, commonly known as protected areas development (PAD) review, aimed to improve our understating of the benefits deriving from PAs and to explore how PAs can support the economic development of the region in which they are located. Comprehensive field studies were carried out in the four countries to:
    - demonstrate how PAs can, in practice, support development in the study areas;
    - assess the appropriateness of rapid assessment methods for an economic appraisal of the benefits accruing from PAs;
    - critically review the existing institutional, administrative and funding arrangements for PA management;
    - identify ways of applying economic concepts into PAs planning and management.
  - In 2002 DFID Natural Resources Systems Programme (NRSP) carried out a project aimed at assessing the impact of marine protected areas (MPAs) on poorer communities living near and around them (Garaway and Esteban 2002). This research used a case study approach. Sites were carefully chosen based on environmental, institutional, and socio-economic information previously gathered by CANARI for 75 MPAs within the Caribbean region. A combination of rapid and participatory rural appraisal techniques were then applied to collect the data needed for this study. More specifically, the techniques used were:
    - review of secondary data sources
    - direct and participant observation
    - semi structured interviews
    - visualisation techniques
- Information was collected on the following main areas:
- identification of poorer stakeholders groups using, or living in and around, the MPA
  - current management practices
  - biological impact of MPA on reef and fishery
  - impact of MPA on fishing practices
  - impact of MPA on activities in tourism industry

- 
- any additional impacts of MPA management perceived by stakeholders
    - levels of participation of local stakeholder groups in management design and/or operation, of MPAs
    - opinions on benefits, costs, opportunities and constraints of MPA management as perceived by local communities and organisations
  - A number of conservation organisations came together in 2002 to form the Conservation Measures Partnership (CMP). CMP can be described as a partnership of conservation organisations that aims to identify or develop better ways to design, manage, and measure the impact of their conservation projects. The member organisations of the CMP have joined this partnership because they believe that, by working together, they have a better chance of making quick progress in the design and implementation of effective monitoring and evaluation methodologies. CMP is currently working on a number of initiatives with the aim of developing a set of mutually acceptable standards for designing, implementing and monitoring conservation projects. One of the most interesting initiative CMP is working on at the moment is probably the CMP Open Standards for the Practice of Conservation (more information can be found on the website of the CMP: <http://www.conservationmeasures.org>, accessed 15 December 2006).
  - Following the many discussions held during the eighth Conference of the Parties to the Convention on Biological Diversity (CBD/COP8) in March 2006 on the issue of equity and conservation, IUCN, CARE International and IIED have decided to support the establishment of a Task Force on Protected Areas and Equity. This team will be established as a task force of the World Commission on Protected Areas (WCPA), under the direction of TILCEPA (Theme on Indigenous and Local Communities, Equity and Protected Areas). The primary aim of the task force will be to promote social equity in the planning and management of PAs, mainly within developing countries. The task force, which will be divided in three regional sub groups (Africa, Latin America and Asia) will be made of experts in the field of PA conservation, poverty and social equity (A Task Force on protected Areas and Equity. Terms of Reference – Draft).
  - In response to the recommendations from the Fifth World Park Congress and CBD Programme of Work on Protected Areas, IUCN has initiated consultations with its members to undertake an initiative aimed at ensuring that people and livelihoods issues are more effectively integrated within PAs planning and management (IUCN 2006). More specifically the project, to be implemented by IUCN secretariat in partnership with two of its commissions (WCPA and CEESP), and planned to run for approximately 6 years (2006-2012), will have the following objectives:
    - develop knowledge and tools (e.g. indicators for more effective monitoring of PA costs and benefits) related to the socio-economic impacts of PAs;
    - field test these tools and build capacity for the application of these tools;
    - significantly advance the policy dialogue and understanding on the relationship between protected areas and poverty.

The main partners identified so far by IUCN to implement this project are: CARE International, IIED, SwedBio, Members of the Poverty Environment Partnership, and OECD Working Group on Economic Aspects of Biodiversity.

---

## 8. Conclusions

A number of conclusions can be drawn from this preliminary research work aimed at identifying methodologies and indicators that could be used to assess the human impact of protected areas.

To start with, there are numerous intrinsic problems linked with assessing the impact that PAs have on people:

- **Scale:** to be truly comprehensive, an assessment of the human impact of protected areas should cover all impacts deriving from the implementation of the protected area both in the short and in the long term, as well as on a local, national, regional and global scale. The reason for this is that, while, a PA could, for example, impoverish people in the short term, by depriving them of the access to traditional resources, it could, in the long term, contribute to increase their income by creating new job opportunities. Likewise, a protected area can impoverish local people while contributing to an increase in the GDP, if the revenues generated by the PA are not redistributed locally but just accrued by the national government.
- **Commensurability:** PAs can have a wide variety of impacts on people and, independently of the assessment method adopted, some of these impacts will always be very difficult to compare. For example, it will always be very difficult to compare the spiritual benefits derived by the tourists who visit a protected area, with the harm sustained by a local household who is forbidden to enter the PA to harvest a traditional herbal remedy.
- **Baseline assessment:** Very rarely we have baseline data referring to the welfare of local households before a park was established. As a consequence, any data we can acquire on household's present welfare loses a lot of its meaning, as we do not have anything to compare it to (Wilkie *et al* 2006). If the protected area has been established recently, a way to solve this problem could be to gather information on the socio-economic situation of people before the establishment of the park based on people's recollection. Otherwise, data can become more meaningful when compared with information collected during subsequent surveys, or when compared with information gathered on nearby households with similar characteristics but not influenced by the park.
- **Cultural differences:** poverty, environment, and poverty-environment linkages are all very complex and broad concepts, which are often perceived very differently by different people (where by 'people' we mean not only indigenous people, but also researchers, decision makers, etc.). The existence of cultural differences in the way people perceive these concepts means that, whatever methodology is chosen to assess the human impact of PAs, care will always be needed in the implementation of this methodology and in the interpretation of the results obtained.

Furthermore, there are numerous problems associated with any research aimed at reviewing existing methodology and indicators that can be used to assess the human impact of protected areas. This is because:

- Various organisations have, over the past decade, engaged in activities aimed at assessing the human impact of specific conservation projects, some of which carried out in protected areas. However, the results of these assessments initiatives are often contained in unpublished reports that are difficult to identify and access. In other cases, these initiatives have never been formally reviewed, and there is no written record of the evaluation performed.
- Most of the work carried out with the aim of developing methodologies and indicators to assess the human impact of protected areas is very recent, if not ongoing. As a consequence, the organisations and teams of researchers engaged in it have not had

the time yet to document their work. Besides, those who have had the time to document their research are not necessarily willing to share their preliminary results.

Despite these difficulties, we can draw some conclusions on methodologies and indicators that could be used to assess the human impact of PAs.

Choosing a set of indicators, a set of indices, or a combination of the two, using indicators and indices that have already been developed, to assess the human impact of PAs, is definitely a possibility. In chapter 3 and 4 we have also made an attempt to identify such sets of indicators and indices, by putting together the indicators and indices that have been most commonly used in this type of studies in the past. A few comments are needed on this:

- In general, it is best to avoid broad sets of indicators. The reason for this is that, while broad sets of indicators may provide a general understanding of a given situation, they tend to mask the most important problems facing the poor in a specific situation (Reed and Tharakan 2004). Experience seems to suggest that 15-30 indicators are enough to cover all significant aspects of a given situation, while still being manageable.
- Past studies suggest that it is possible to identify a generic set of indicators that is representative of all issues relevant to the poor. However, given a generic set of indicators, not all these indicators will necessarily have to be used in each situation. The precise set of indicators to be used in each specific situation will have to be identified on the base of factors like local conditions, availability of data, cost effectiveness, etc.
- Despite its many limits, the Human Development Index remains one of the best measures available to quantify overall human well being. The use of HDIs disaggregated at the sub national level and by social groups could be particularly useful to assess the impact of PAs on people.

Many researchers agree that a specific type of indicators, the so-called poverty-environment indicators, have a better potential, compared to just poverty or just environment indicators, to capture the complexity of the relationship linking poverty and the environment. A possible list of poverty-environment indicators that could be used to assess the impact of PAs on people has been presented in chapter 4, however more effort should be put in developing better quality poverty-environment indicators. Moreover, great care must be used when implementing these indicators and in the interpretation of the results provided by them.

Local and geographically referenced indicators and indices, as well as many other types of data, can also be used to develop poverty maps. Poverty mapping has numerous potential advantages as a tool to assess the impact of protected areas on people, and thanks to the recent improvements in technology and in statistical and econometrics techniques, poverty maps have been produced more and more frequently in recent years. One study in particular (de Sherbinin 2006) has proved how poverty maps could be used to explore the linkages between poverty and PAs. However, this study has also highlighted the most important limit of this methodology, which is the lack of data availability at the sub national level.

Socio-economic indicators, poverty environment indicators and poverty maps are all methodologies ultimately based on some external actor's opinion (e.g. researcher, decision maker, etc.) of what is relevant for the well being of local people. From this point of view we could define these as top down approaches. Another possible approach to the issue of evaluating the human impact of PAs is to ask local people what they believe is important for their well being, and to create indicators based on their answers. This approach can be described as bottom up or participatory. Compared to top down approaches, participatory approaches have the advantage of measuring what is really relevant to local people, therefore indicators developed locally are more meaningful; however, when dealing with this type of indicators it is more difficult to make comparisons at the local, national, regional or global level. In addition, participatory approaches are very time consuming and expensive.

In accordance with many studies, this reviews also suggests that, in order to achieve a significant assessment of a process or situation, it might be useful to combine more than one evaluation technique, for example indicators and qualitative assessments.

## ***Bibliography***

- Ashley, C. and Hussein, K. (2000) *Developing Methodologies for Livelihood Impact Assessment: Experience of the African Wildlife Foundation in East Africa*, ODI, London
- Ashley, C. with Elliott, J., Sikoyo, G., and Hanlon, K. (1999) *Handbook for Assessing the Economic and Livelihood Impacts of Wildlife Enterprises*, African Wildlife Foundation and Overseas Development Institute
- Bigman, D. and Fofack, H. (2000), *Geographical Targeting for Poverty Alleviation: An Introduction to the Special Issue*, The World Bank Economic Review, 14 (1): 129-145
- BirdLife International (2006) *Monitoring the Socio-Economic Impacts of Projects at IBAs: A Global Framework*, version 0. Unpublished draft
- Chape, S., Blyth, S., Fish, L., Fox, P., and Spalding, M. (compilers) (2003) *2003 United Nations List of Protected Areas*, IUCN, Gland and Cambridge and UNEP- WCMC, Cambridge
- Christiansen, G. and Conner, N. (1999) *The contribution of Montague Island Nature Reserve to regional economic development*. New South Wales National Parks and Wildlife Service, Hurstville, NSW, Australia
- CIESIN (Center for International Earth Science Information Network) (2006) *Where the Poor Are: An Atlas of Poverty*, Columbia University, New York
- de Sherbinin, A. (2006) *Protected Areas and Poverty: Selected Descriptive Statistics*, unpublished document, CIESIN
- Deichmann, U. (1999) *Geographic Aspects of Inequality and Poverty*, World Bank, Washington D.C.
- Esty, D.C., Levy, M.A., Srebotnjak, T. and de Sherbinin, A. (2005) *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*, Yale Center for Environmental Law & Policy, New Haven
- Esty, D.C., Levy, M.A., Srebotnjak, T., de Sherbinin, A., Kim, C.H. and Anderson, B. (2006) *Pilot 2006 Environmental Performance Index*, Yale Center for Environmental Law & Policy, New Haven
- Fanshawe, J. and Thomas, D. (2005a) *Developing an Approach for Monitoring the Contribution of BirdLife's Local Work to Human Well being and Poverty Reduction*, BirdLife International (unpublished discussion paper)
- Fanshawe, J. and Thomas, D. (2005b), *Basic Framework for Monitoring Poverty Reduction Impact at IBAs and Projects*, BirdLife International (unpublished discussion paper)
- Gallopín, G. (1997) Indicators and Their Use: Information for Decision-Making, in Moldan, B. and Billharz, S. (eds) *Sustainability Indicators. Report on the Project on Indicators of Sustainable Development*, John Wiley, Chichester, UK
- Garaway, C. and Esteban, N. (2002) *The impact of marine protected areas on poorer communities living in and around them: institutional opportunities and constraints: Appendix 1 – methodology for case study fieldwork*, December 2002

- Henninger, N. (1998) *Mapping and Geographic Analysis of Human Welfare and Poverty: Review and Assessment*, WRI, Washington D.C.
- Henninger, N. and Hammond, A. (2002) *Environmental Indicators Relevant to Poverty Reduction*, Environment Strategy Papers No 3, World Bank, Washington D.C.
- Henninger, N. and Snel, M. (2002) *Where are the Poor? Experiences with the Development and Use of Poverty Maps*, WRI, Washington D.C.
- ICEM (2003) *Field Studies: Economic Benefits of Protected Areas*, Lower Mekong Protected Areas and Development Review, Indooroopilly, Queensland, Australia
- IUCN (2006) *Earth's Special Places. Investing in IUCN's Work on Protected Areas*, IUCN, Gland
- Kapos, V., Aveling, R., Bubb, P., Carey, P., Entwistle, A., Hopkins, J., Mulliken, T., Safford, R., Stattersfield, A., Walpole, M. and Balmford, A. (2006) *Building Consensus about Measuring Conservation Success: Preliminary Results from a 20-Organisation Project*, 1st European Congress for Conservation Biology, Eger, Hungary
- Katariya, V., de Sherbinin, A., Oviedo, G. and Wagner, M. (eds) (2005) *Poverty-Conservation Mapping: The Geography of Poverty and Biodiversity*, UNEP, GRID Arendal, ADB, Cooperazione Italiana, IUCN
- Locally-Managed Marine Protected Area Network (2003) *Learning Framework for the Locally-Managed Marine Area Network*, LMMA Network, Suva
- Nunan, F. with Grant, U., Bahigwa, G., Muramira, T., Bajracharya, P., Pritchard, D., and Jose Vargas, M. (2002) *Poverty and the Environment: Measuring the Links. A Study of Poverty-Environment Indicators with Case Studies from Nepal, Nicaragua and Uganda*, Environment Policy Department, Issue Paper No. 2, DFID, London
- OECD (2001) *The DAC Guidelines: Poverty Reduction*, Organisation for Economic Cooperation and Development, France
- Pennushi, G., Rubio, G. and Subbarao, K. (2001) 'Monitoring and Evaluation', in *Poverty Reduction Strategy Papers Source Book*, World Bank, Washington, D.C.
- Plumptre, A.J., Kayitare, A., Rainer, H., Gray, M., Munanura, I., Barakabuye, N., Asuma, S., Sivha, M., and Namara, A. (2004) *The Socio-economic Status of People Living Near Protected Areas in the Central Albertine Rift*, Albertine Rift Technical Reports N°4
- Poverty Environment Partnership (2005) *Assessing Environment's Contribution to Poverty Reduction*, UNDP, N.Y
- Reed, D. and Tharakan, P. (2004) *Developing and Applying Poverty Environment Indicators*, WWF, Washington D.C.
- Roche, C. (1999) *Impact Assessment for Development Agencies*, Oxfam, Oxford
- Sayer, J., Campbell, B., Maginnis, S. and Sengupta, S. (2006a) *How to Assess the Outcomes of Conservation and Development Interventions in Landscape Mosaic* (working draft), IUCN, WWF, CIFOR
- Sayer, J., Campbell, B., Petheram, L., Aldrich, M., Ruiz Perez, M., Endamana, D., Nzooh Dongmo, Z., Defo, L., Mariki, S., Doggart, N. and Burgess, N. (2006b) 'Assessing Environment and Development Outcomes in Conservation Landscapes', Biodiversity Conservation
- Scherl, L.M., Wilson A., Wild, R., Blockhus, J., Franks, P., McNeely, J.A. and McShane, T.O.



- (2004) *Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations*, IUCN, Gland
- Shyamsundar, P. (2002) *Poverty-Environment Indicators*, Environmental Economics Series, Paper No. 84, World Bank, Washington D.C.
- Snel, M. (2004) *Poverty-Conservation Mapping Applications*, paper delivered at the IUCN World Conservation Congress, 17-25 November 2004
- UNDP (2004) *Human Development Report 2004: Identity, Diversity and Globalization*, Oxford University Press, New York and Oxford
- Walpole, M. (2006) Partnerships for Conservation and Poverty Reduction, *Oryx* 40(3): 245-246, Cambridge University Press, Cambridge
- Walpole, M. and Wilder, L. (2006) *The Case for Integrating Conservation and Human Needs*, *Fauna & Flora*, No 9, October 2006
- Wildlife Conservation Society (2006) 'Household Surveys – A Tool for Conservation Design, Action and Monitoring', *Living Landscapes Technical Manual* N°4
- Wilkie, D.S., Morelli, G.A., Demmer, J., Starkey, M., Telfer, P. and Steil, M. (2006) 'Parks and People: Assessing the Human Welfare Effects of Establishing Protected Areas for Biodiversity Conservation', *Conservation Biology* 20(1): 247-249
- Woodhouse, P., Howlett, D. and Rigby, D. (2000) *A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods*, Sustainability Indicators for Natural Resource Management and Policy, Working Paper No. 2. Development and Project Planning Centre, University of Bradford, UK; University of Fort Hare, South Africa Economic Policy Research Centre, Makere, Uganda; Institute for Development Policy and Management and Centre for Agricultural, Food and Resource Economics, University of Manchester, UK

## ***Appendix A – Socio-Economic Indicators and Indices***

## Indicators\*

| Name of Indicator                        | Definition   | Primary Source of Data | Secondary data holder   | Spatial Resolution | Data Policy |
|--|--|------------------------|---|--------------------|-------------|
| <b>Demographic / Human well being</b>    |  |                        |   |                    |             |
| Adult illiteracy                         | The percentage of people aged 15 and over who cannot, with understanding, read and write a short, simple statement about their everyday life   | UNESCO                 | OECD<br>UNICEF<br>UNDP<br>UN Population Division<br>UNSD<br>WB<br>WRI | N-R-G              | Open        |
| Age distribution                         | It is the percentage of the population in the three age groups of 0-14, 15-59 and 60 years and over  | UN Population Division | UNICEF<br>UNDP<br>WB<br>WRI   | N-R-G              | Open        |
| Infant mortality                         | The proportion of children who die before reaching the age of 12 months  | UN Population Division | OCSE<br>UNICEF<br>UNDP<br>UNSD<br>WB<br>WHO<br>WRI                    | N-R-G              | Open        |
| Life expectancy                          | The average number of years people would be expected to live if the current mortality conditions (i.e. age-specific mortality rates) prevailed throughout their lives  | UN Population Division | UNICEF<br>UNSD<br>WB<br>WHO<br>WRI                                    | N-R-G              | Open        |
| Natural disasters                        | The number of deaths from natural and technological disasters. Natural disasters include avalanches, cold waves, cyclones, hurricanes, typhoons, drought, earthquakes and epidemics. Technological disasters include transport accidents, chemical accidents and urban fires | CRED                   | UNDP<br>UNEP<br>WHO   | N-R-G              | Open        |
| Population density                       | The number of inhabitants per unit of total area   | UN Population Division | WB<br>WRI   | S-N-R-G            | Open        |
| Population growth rate                   | The total increase of the population during a given period (usually a year) based on the mean population of that period  | UN Population Division | UNDP<br>UNEP<br>UNICEF<br>UNSD<br>WB<br>WRI                           | N-R-G              | Open        |
| Population living below the poverty line | The percentage of the population (rural or urban) living below the national (rural or urban) poverty line  | WB                     | OECD<br>UN Population Division<br>UNSD                                | S-N                | Open        |
| Total population                         | Total population usually includes all residents regardless of legal status or citizenship. It does not include refugees who are not permanently settled in the country of asylum (these are generally considered to be part of   | UN Population Division | UNICEF<br>UNDP<br>WB<br>WRI   | N-R-G              | Open        |

|  |  |                        |   |         |      |
|--|--|------------------------|---|---------|------|
|  | the population of their country of origin)   |                        |   |         |      |
| <i>Urban population</i>                | The ratio of the total population within "urban agglomerations"  | UN Population Division | HABITAT<br>UNDP<br>UNEP<br>UNSD<br>WB<br>WRI                                      | S-N-R-G | Open |
| <b>Economics / Energy / Technology</b> |  |                        |   |         |      |
| <i>Carbon dioxide emissions</i>        | The indicator measures the emissions of carbon dioxide from solid, liquid and gaseous fuels, gas flaring, and cement manufacturing   | CDIAC                  | IEA<br>OECD<br>UNDP<br>UNEP<br>UNSD<br>WB<br>WRI                                  | N-R-G   | Open |
| <i>Conventions ratified</i>            | Environment related conventions and treaties ordered by countries  | CIESIN                 |   | N-R-G   | Open |
| <i>Energy use</i>                      | It is the commercial energy use. It refers to apparent consumption, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport  | UNSD                   | IEA<br>OECD<br>WB<br>WRI  | N-R-G   | Open |
| <i>Genuine domestic savings</i>        | Genuine domestic savings are the net domestic savings, plus education expenditure, minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide damage  | WB                     |   | N-R-G   | Open |
| <i>Gross domestic product</i>          | Gross Domestic Product (GDP), at purchaser prices, is the sum of the gross value added by all resident producers in the economy plus any taxes and minus any subsidies not included in the value of the products. Per capita figure is obtained dividing total GDP by the mid-year population data | UNSD                   | FAO<br>IEA<br>IMF<br>OECD<br>UNDP<br>UNICEF<br>UNESCO<br>UNEP<br>WB<br>WHO<br>WRI | N-R     | Open |
| <i>Primary energy production</i>       | Primary energy is the energy sources as found in their natural state (as opposed to derived or secondary energy, which results from the transformation of primary sources). The data are on the total primary energy produced by a country   | UNSD                   | IEA<br>OECD<br>WRI  | N-R-G   | Open |
| <i>Research and development</i>        | Research and Development (R&D) is the current and capital expenditures on creative, systematic activities that increase the stock of knowledge. It includes fundamental and applied research and experimental development work leading to new devices, products, or processes                      | UNESCO                 | OECD<br>WB  | N-R-G   | Open |
| <b>Human health</b>                    |  |                        |   |         |      |
| <i>Calories availability</i>           | The food supply available per capita for human consumption during the reference period in terms of quantity.   | FAO                    | OECD<br>UNICEF<br>UNDP  | N       | Open |

|   |   |                 |  |       |         |
|---|---|-----------------|--|-------|---------|
|   | caloric value and protein and fat content   |                 | WB<br>WHO<br>WRI   |       |         |
| <i>Government expenditure for health</i>        | Government (or public) expenditure on health consists of recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and non-governmental organizations), and social (or compulsory) health insurance funds | WHO             | OECD<br>UNICEF<br>UNDP<br>WB   | N-R-G | Open    |
| <i>Health care</i>                              | It is the proportion of the population that can expect treatment for common diseases and injuries, including essential drugs on the national list, within one hour's walk   | WHO             | OECD<br>UNDP<br>UNICEF<br>UN<br>Population Division<br>UNSD<br>WB<br>WRI | N-R   | Open    |
| <i>Malnutrition prevalence</i>                  | The percentage of children under the age of five that are moderately or severely underweight and/or suffer from wasting and stunting  | WHO             | FAO<br>UNICEF<br>UNDP<br>UN<br>Population Division<br>UNSD<br>WB<br>WRI  | N-R-G | Open    |
| <i>Microbial water- and food-borne diseases</i> | Number of water-borne and food-borne disease cases per 1000 habitants   | WHO             | UNEP<br>WRI  | N-R-G | Limited |
| <i>Safe water</i>                               | The percentage of the population with reasonable access to adequate amounts of safe water (including treated surface water and untreated, but uncontaminated water, such as from springs, sanitary wells, and protected boreholes)  | WHO             | OECD<br>UNICEF<br>UNDP<br>WB<br>WRI                                      | N-R-G | Open    |
| <i>Sanitation</i>                               | The percentage of the population with access to least adequate excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta  | WHO             | OECD<br>UNDP<br>UNICEF<br>UNSD<br>WB<br>WRI                              | N-R   | Open    |
| <b><i>Industrial / Urban</i></b>                |   |                 |  |       |         |
| <i>Hazardous waste</i>                          | It is the countries balance of imported and exported hazardous waste (net transfrontier movement)   | OECD            |  | N     | Open    |
| <i>Industry sector</i>                          | It is the percentage of GDP which is produced by the secondary sector   | UNSD            | IMF<br>OECD<br>UNDP<br>WB  | N-R-G | Open    |
| <i>Motor vehicle network</i>                    | The number of motor vehicles per km of road network   | OECD            | IRF<br>WB  | N     | Open    |
| <i>Motor vehicle ownership</i>                  | The total number of motor vehicles divided by the total population (i.e. motor vehicles per capita)   | OECD<br>HABITAT | IRF<br>WB<br>WRI   | S-N   | -       |
| <i>Municipal waste</i>                          | The total amount of waste generated by the municipal sector. Municipal waste disposal is the amount of waste  | OECD            | HABITAT<br>UNDP<br>WHO   | N     | Open    |

|  |  |              |                           |         |            |
|--|--|--------------|---------------------------|---------|------------|
|  | that is incinerated, land filled, and recycled or composted  |              | WRI                       |         |            |
| <i>Ozone depleting substances</i>                  | The production and consumption of Ozone Depleting Substances (ODS, see rationale for details) from countries that are Parties of the Montreal Protocol   | UNEP         |                           | N       | Open       |
| <i>Pollution abatement and control expenditure</i> | Activities aimed directly at the prevention, reduction and elimination of pollution or undesirables arising from production processes or the consumption of goods and services   | OECD         |                           | N-R     | Open       |
| <i>Waste recycling</i>                             | The percentage of waste material that is recycled (domestic production plus imports minus exports)   | OECD         | UNDP                      | N       | Open       |
| <b>Natural resources / Rural</b>                   |  |              |                           |         |            |
| <i>Agricultural productivity</i>                   | The ratio of agriculture value added, measured in constant 1995 US dollars, to the number of workers in agriculture  | WB           |                           | N-R-G   | Open       |
| <i>Arable land</i>                                 | Land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). This category does not include abandoned land resulting from shifting cultivation. Data for "Arable Land" are not meant to indicate the amount of land that is potentially cultivable  | FAO          | UNEP<br>WB                | S-N-R-G | Open       |
| <i>Fertilizers</i>                                 | The national production and consumption of fertilizers. Fertilizer production includes nitrogenous, phosphate and potash fertilizers. Production based on imported ammonia, phosphoric acid or rock phosphate is also considered national production, while that based on imported finished fertilizers (ammonium phosphate, potassium chloride, etc.) is excluded from national production to avoid double counting at the world level. Fertilizer consumption refers to total fertilizer use. The total estimates are obtained by adding the volumes of nitrogenous, phosphate and potash fertilizers expressed in terms of plant nutrients (N, P <sub>2</sub> O <sub>5</sub> and K <sub>2</sub> O respectively) | FAO          | OECD<br>WB<br>WRI         | N-R-G   | Open       |
| <i>Forest deforestation</i>                        | The conversion of forest to another land use or the long-term reduction of tree canopy cover below the minimum 10% threshold (see forest total area methodology sheet for a definition of forest)  | FAO          | UNDP<br>UNEP<br>WB<br>WRI | S-N-R-G | Open       |
| <i>Forest ownership</i>                            | Forest and other wooded land of public and private ownership including, eventually, forest owned by indigenous or tribal peoples   | FAO<br>UNECE |                           | N-R     | Open       |
| <i>Forest plantations</i>                          | New forest plantation figures are obtained by aggregating data according to the definitions of   | FAO          |                           | N-R     | Restricted |

|                                    |   |               |   |         |         |
|------------------------------------|---|---------------|---|---------|---------|
|                                    | afforestation and reforestation. Afforestation is the artificial establishment of forest on lands which previously did not carry forest within living memory. While reforestation is the artificial establishment of forest on lands which have previously carried forest   |               |   |         |         |
| <i>Forest total area</i>           | A area of land over 0.5 hectares (ha) containing a tree crown cover of at least 10 percent (or equivalent stocking level, see measurement for definition's details)   | FAO           | OECD<br>UNDP<br>UNECE<br>UNEP<br>WRI                              | S-N-R-G | Open    |
| <i>Irrigation potential</i>        | Percentage of the total cultivable land area that is suitable for irrigation development, including land already under irrigation   | FAO           | WB<br>WRI   | N-R-G   | Open    |
| <i>Labour force in agriculture</i> | The percentage of the economically active population engaged in or seeking work in agriculture, hunting, fishing or forestry  | ILO           | FAO<br>OECD<br>UNDP<br>UN<br>Population<br>Division<br>UNSD<br>WB | N-R-G   | Open    |
| <i>Land area protected</i>         | The sum of totally or partially protected areas of at least a 1,000 hectares that are designed as national parks, natural monuments, nature reserves, wildlife sanctuaries, protected landscapes and seascapes, or scientific reserves with limited public access   | UNEP-<br>WCMC | FAO<br>OECD<br>UNDP<br>UNESCO<br>UNEP<br>WB<br>WRI                | N-R-G   | Open    |
| <i>Pesticide use</i>               | Any substance or mixture of substances that is used to prevent, destroy or control pests It includes vectors of human or animal disease, and unwanted species of plants or animals. Pesticides may cause harm during, or otherwise interfere with, the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs. Pesticides also includes substances are administered to animals to control insects, arachnids or other pests | FAO           | EUROSTAT  | N-R     | Limited |
| <i>Sawn wood</i>                   | Wood (including sleepers) sawn length wise or produced by a profile-chipping process, and planed wood   | FAO           | OECD<br>UNEP<br>WB<br>WRI   | N-R-G   | Open    |
| <i>Water dependency</i>            | The total renewable water resources originating outside the country   | FAO           |   | N-R-G   | Open    |
| <i>Water use intensity</i>         | The percentage of total renewable water resources withdrawn from a country  | FAO           | WB<br>WRI   | N-R     | Open    |
| <i>Water withdrawal</i>            | The total water withdrawn divided by the population   | FAO<br>OECD   | UNDP<br>UNEP<br>WRI   | N-R     | Open    |
| <i>Water withdrawal by sector</i>  | The share of water withdrawn by the three main sectors (Domestic, Industrial, and Agricultural)   | FAO<br>OECD   | UNDP<br>UNEP<br>WB<br>WRI   | N-R     | Open    |

|                                   |  |     |              |       |      |
|-----------------------------------|--|-----|--------------|-------|------|
| <i>Wood for fuel and charcoal</i> | Roundwood, coniferous and non-coniferous, that will be used as fuel for purposes such as cooking, heating or power production, or used for charcoal production | FAO | OECD<br>UNEP | N-R-G | Open |
|-----------------------------------|--|-----|--------------|-------|------|

S = Sub national

N = National

R = Regional

G = Global

\*Source used for the table above: Terrestrial Ecosystem Monitoring Sites (TEMS) 2006, a metadatabase of the Global Terrestrial Observing System (GTOS), [www.fao.org/gtos/tems](http://www.fao.org/gtos/tems)

## Indices

| Name of Index                        | Definition   | Primary Source of Data   | Spatial Resolution | Data Policy |
|--------------------------------------|--|--|--------------------|-------------|
| <i>Human development index</i>       | The Human Development Index (HDI) is the average of the life expectancy index, the educational attainment index and the adjusted GDP per capita (PPP US\$) index. It is derived by dividing the sum of these three indices by three.   | United Nations Development Programme (UNDP), <a href="http://www.undp.org/hdro/">http://www.undp.org/hdro/</a>         | N-R-G              | Open        |
| <i>Agricultural production index</i> | The country's agriculture sector disposable output (after the deduction of feed and seed) relative to a given base period average of three years (in the case of index prepared by the Food and Agriculture Organization). The agricultural production index includes all crop and livestock products originating from a country | Food and Agriculture Organization of the United Nations (FAO), <a href="http://apps.fao.org/">http://apps.fao.org/</a> | S-N-R-G            | Open        |
| <i>Food production index</i>         | The total country production of food crops that are considered edible and that contain nutrients. Coffee and tea are excluded because although edible, they have no nutritive value  | Food and Agriculture Organisation of the United Nations (FAO), <a href="http://apps.fao.org/">http://apps.fao.org/</a> | N-R-G              | Open        |



## ***Appendix B – Poverty-Environment Indicators***

## DFID - Poverty and the Environment: Measuring the links

The purpose of this study is to develop and test a set of generic poverty-environment indicators for potential use in poverty reduction strategy papers (PRSPs). This study was motivated by the recognition that, while numerous indicators have been developed to assess either the state of the environment or the state of human well being, there is a general lack of indicators able to capture the relationship linking poverty and the environment. The development of generic poverty-environment indicators in this study was based on a review of: environmental issues raised by the poor through PPAs, other sources of information on environmental issues of relevance to the poor, and relevant indicator initiatives carried out by other organisations.

According to the review carried out by Nunan *et al* (2002), the most significant environmental issues to the livelihoods of the poor are: the quality of the natural resource base; access to natural resources; changes in biodiversity, increasing water demands, natural disasters; the role of environmental factors in affecting the health of the poor; access to environmental information. In particular, issues surrounding access to, and control over, common property resources are critical aspects of the livelihoods strategies of the poor, and should be considered in the development of poverty-environment indicators.

Nunan *et al* (2002) also carried out a survey of other indicator initiatives. The following are the most relevant:

1. The World Bank (Bucknall, *et al* 2000) has developed poverty-environment indicators to be used in PRSPs. Some of the indicators developed are the following:
  - Number/share of households using clean fuels; type of housing
  - Annual mean level of PM10 ( $\mu\text{g}/\text{m}^3$ ); lead level in blood
  - Access to sanitation (%of households)
  - Access to water (%of households)
  - Natural and social capital (e.g. resource productivity, water scarcity, security of tenure)
  - Malnutrition
  - Ability to restore savings after a natural disaster
2. The World Bank has also developed a number of initiatives to promote the use of environmental indicators in World Bank projects, like:
  - Under five mortality rate
  - Access to sanitation in urban areas
  - Depletion estimates
  - Degradation estimates
  - Proportion of communities with access to roads (%)
  - Rate of deforestation (ha/year)
3. Woodhouse *et al* (2000) identify indicators to assess the sustainability of particular strategies for natural resource management, using the sustainable livelihoods framework:
  - Natural: access to land, water, grazing; ownership of herds, trees; productivity (per unit of land, per unit of water, per unit of inputs); soil, water, rangeland, quality; biodiversity
  - Financial: income levels, variability over time, distribution within society; financial savings, access to credit; debt levels
  - Physical: access to roads, electricity, piped water; ownership/access to productive equipment (oxen, tractor, irrigation pump, etc.); housing quality
  - Human: total labour; educational level, skills; health levels
  - Social: membership of organisations; support from kin, friends; accountability of elected representatives

Woodhouse *et al* (2000) also identify indicators at different levels: district, village(or community), household (or farm), plot.
4. Prabhu *et al* (1999) identify indicators to assess the sustainability of forest management. Some of these indicators are:
  - Security of tenure (includes status of length, exclusivity, enforceability and transferability)
  - Existence of property rights for exploited non-timber forest products (e.g. fuelwood)
  - Rules and norms of resource use are monitored and enforced

- Access to forest resources is perceived locally to be fair
- Local people feel secure about access to resources
- Opportunities exist for local and forest-dependent people to receive employment and training from forest companies
- Baseline studies of local human systems are available and consulted
- Management of NTFP reflects the interests and rights of local stakeholders

Based on a review of previous studies carried out on the subject, this report identifies the following as the main environmental issues of relevance to the poor, to keep in mind when choosing a set of poverty-environment indicators:

- Environment and health
- Forest cover
- Soil degradation
- Water quantity and quality
- Fisheries
- Natural disasters

Based on a review of other indicator initiatives, also a number of other themes relevant for the selection of poverty-environment indicators emerged: tenure, property rights, access to drinking water, access to sanitation. The selection of indicators was guided also by the use of the environmental entitlements framework and the sustainable livelihoods framework.

Environmental entitlements framework: this framework offers a way to understand the relationships between environment and poverty. This approach suggests that the links between environmental change and impoverishment are not direct, but are mediated by poor people's interactions with particular environments. Environmental entitlements refer to two main attributes: access to resources, and control over the use of those resources.

Sustainable livelihood framework: This framework offers a way of thinking about the objectives, scope and priorities for development, in order to enhance progress in poverty elimination. The framework facilitates analyses of the relationships between poverty and environment, by highlighting aspects relevant to decisions about livelihood strategies.

Finally, the development of a generic set of indicators was guided by:

- The selection of overall targets (for this study, the targets chosen were two: economic well being and environmental sustainability)
- Ease of access to information or data collection

Table 1. The set of generic poverty-environment indicators developed by the study

| Area   | Poverty-environment indicator   | Potential data sources  |
|--|---|---|
| Food security and ownership of or access to land | - Proportion of the poor with secure use rights to land for farming<br>- Percentage of poor farmers with access to x hectares to grow food for household consumption                        | - National legislation<br>- PPA   |
| Power and voice                                  | - Area of forests co-managed by user groups with representatives of the poor<br>- Access to sanitation facilities by women  | - National ministries and statistical bureaux<br>- PPA  |
| Water security                                   | - Hours spent per day collecting water by women and children living in rural areas (noting seasonal variations)<br>- Percentage of household income spent on water in urban areas           | - UNICEF multiple indicator cluster survey data<br>- National ministries and statistical bureaux<br>- PPA |
| Agricultural productivity                        | Percentage of poor farmers with access to sustainable irrigation facilities   | - National ministries and statistical bureaux<br>- PPA  |
| Substandard housing                              | - Percentage of people living in substandard housing (rural and urban figures)<br>- Density of housing in urban areas   | - Government department with responsibility for housing   |
| Illness  | Proportion of health burden of the poor related to environmental factors – disease incidence related to environmental factors disaggregated by age (e.g. vulnerability of children under 5) | - National ministries and statistical bureaux<br>- WHO<br>- World Development Indicators                  |

|  |   |   |
|--|---|---|
| Living in environmentally fragile areas, such as arid and tropical lands with limited soil fertility | <ul style="list-style-type: none"> <li>- Proportion of the poor living in ecological fragile areas</li> <li>- Proportion of the poor living in ecologically fragile areas whose main source of livelihood is agriculture (either subsistence, agriculture, or farm labouring?)</li> <li>- Access to non-farm sources of livelihood for the poor living in ecologically fragile areas</li> </ul>               | <ul style="list-style-type: none"> <li>- National ministries and statistical bureaux</li> <li>- PPA</li> </ul>  |
| Access to common property resources by women, especially water, fuelwood and NTFPs                   | <ul style="list-style-type: none"> <li>- Hours spent per day/week collecting fuelwood by women and children in rural areas</li> <li>- Percentage of household income spent on fuel in urban areas</li> <li>- Percentage of common property land available to women for collecting fuelwood and non-timber products</li> <li>- Percentage of poor fisher folks with access to adequate fish catches</li> </ul> | <ul style="list-style-type: none"> <li>- UNICEF multiple indicator cluster</li> <li>- National ministries and statistical bureaux</li> <li>- PPA</li> </ul> |
| Natural disasters  | <ul style="list-style-type: none"> <li>- Percentage of the population living in areas prone to flooding</li> <li>- Number of poor people killed by environmentally related disasters</li> <li>- Number of poor people made homeless by environmentally related disasters</li> </ul>   | Government department with responsibility for flood control and disasters   |

The set of generic poverty-environment indicators developed in this study was then pilot tested in Uganda, Nepal and Nicaragua. The following are some of the results of the testing phase:

- All the countries studies modified the wording of many of the indicators, thus obtaining country-specific indicators that reflect more appropriately:
  - the situation of the poor in each country
  - the relevance of environmental resources for their livelihoods strategies
  - the sources of data available

It should be noted that, when reworded, indicators become more appropriate for describing a specific situation, but comparisons between countries become more difficult

- None of the country studies introduced completely new indicators, which could suggests that the generic indicators selected by this study are representatives of all environmental issues relevant to the poor
- There are strong differences in the availability of data for each country

In conclusion, the main lessons Nunan *et al* (2002) draw from their study are the following:

- Generic indicators can not capture the complexity of the relationships between poverty and the environment
- The development of any set of indicators will always be a compromise between the relationships of concern, and the ability to collect appropriate data
- Given a set of generic indicators, further refinement at country level can make the indicators more specific and less ambiguous.

#### *Relevant publications:*

Bucknall, J., Hamilton, K., Kishor, N., Kraus C. and Pillai, P. (2000) Environment, in *Sourcebook for PRSPs* (draft). World Bank, Washington, D.C.

Nunan, F. with Grant, U., Bahiigwa, G., Muramira, T., Bajracharya, P., Pritchard, D., and Jose Vargas, M. (2002) *Poverty and the Environment: Measuring the Links*. A Study of Poverty-Environment Indicators with Case Studies from Nepal, Nicaragua and Uganda, Environment Policy Department, Issue Paper No. 2, DFID, London

Prabhu, R., Colfer, C. and Dudley R.G. (1999) *Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management*, Criteria and Indicators ToolBox Series No. 1, CIFOR, Jakarta

Woodhouse, P., Howlett, D. and Rigby, D. (2000) *A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods*, Sustainability Indicators for Natural Resource Management and Policy, Working Paper No. 2. Development and Project Planning Centre, University of Bradford, UK; University of Fort Hare, South Africa Economic Policy Research Centre, Makerere, Uganda; Institute for Development Policy and Management and Centre for Agricultural, Food and Resource Economics, University of Manchester, UK

## WWF – Macroeconomics Programme Office

### Developing and Applying Poverty Environment Indicators

During the 1990s WWF-MPO conducted significant work to analyse the impact of macroeconomic and institutional reforms on the environment and on the rural poor. This analytical work, combined with lessons learnt directly from the field, resulted in the development of a P-E information and indicator system, described by Reed and Tharakan in their well known paper 'Developing and Applying Poverty Environment Indicators'.

WWF-MPO's approach to developing a P-E information and indicator system is based on identifying a specific set of indicators for each situation under analysis. The indicators should belong to one of the following three categories of P-E indicators: 1) status indicators, 2) enabling conditions indicators, and 3) social capital indicators.

- 1) Status indicators are probably the most common and uncontroversial indicators used to measure poverty, environment, and poverty-environment issues. They provide a quantitative picture of the status of the issue under analysis. Examples of P-E status indicators are: distance and/or time to collect forest resources (which gives information on the per-capita availability of resources); number of individuals affected by flood and drought (which gives information on the level of vulnerability of local people to natural disasters).
- 2) Enabling condition indicators reflect societal responses to environmental and poverty problems, and to poverty-environment dynamics. Indicators of enabling conditions can be grouped into three basic categories:
  - a. institutional arrangements indicators, which measure the scope, characteristics and capabilities of institutions that influence P-E dynamics; e.g. training and capacity building programs (which provides information on the level of empowerment of local people)
  - b. economic policies and incentives indicators, which measure the magnitude of financial resources, the impact of specific market dynamics, and the influence of policy reforms that shape the P-E nexus; e.g. investment programs for infrastructure (which gives information on budgetary allocation)
  - c. ecological management capacity indicators, which measure the ability of institutions to prepare for and respond to anticipated trends and unexpected environmental shocks; e.g. planned steps to protect the poor from any unintended consequences (which provides information on the level of environmental risk mitigation adopted).
- 3) Social capital indicators measure the capacity of a population to influence basic decisions and institutional arrangements that shape their livelihoods and natural resource use. Social capital indicators are particularly important because, especially in rural areas of the developing world, where private capital is limited if non-existent, the possibility of affecting the P-E nexus relies heavily on social capital.

The WWF-MPO's approach recommends to integrate the information obtained by the development and implementation of a set of quantitative indicators, with the information derived from qualitative assessments, which should be based on a framework built around the concept of social capital. In particular, in the context of P-E dynamics, qualitative assessments should be able to: identify the key institutions shaping the relationship between rural livelihoods and natural resources, and assess the capacity of the poor to influence those institutions; identify the key economic forces and factors that shape the relationship between rural livelihoods and natural resources; identify the ways in which the rural poor can improve livelihoods and resource management; assess the effectiveness of existing management systems to influence the P-E nexus.

WWF-MPO's study is very interesting because it is one of the first (and only) studies which has attempted to develop and use poverty-environment indicators. However, this approach has been designed mainly with the aim of analysing the impact of macroeconomic and institutional reforms on the environment and on the rural poor, therefore, it does not have direct potential for application to the assessment of the human impact of protected areas. Nevertheless, two lessons can be learnt from this approach:

- To achieve a significant assessment of a process or situation it might be useful to combine more than one evaluation technique; e.g. indicators and qualitative assessments
- A different set of indicators might be needed to be able to capture the specific issues related to the linkages between poverty alleviation and biodiversity conservation in each local situation

*Relevant publications:*

Reed, D., Tharakan, P. (2004) *Developing and Applying Poverty Environment Indicators*, WWF, Washington D.C.

## World Bank - Poverty-Environment Indicators

In 2002 the World Bank published a study called 'Poverty-Environment Indicators' (Shyamsundar 2002). This study was carried out with the goal of identifying indicators that could be used to assess poverty-environment interactions. Recognising the complexity of the poverty-environment relationship, this study explicitly chose to address only one of its dimensions, that is how environmental factors influence poverty. More specifically, the study tried to identify poverty-environment indicators that could be used to assess how environmental factors impact the health and the wealth of the poor.

First of all, the World Bank's study distinguishes between intermediate and final indicators. Intermediate indicators are the indicators used to monitor inputs (resources provided by a project) and outputs (goods and services that result from a project); final indicators are the indicators used to monitor outcomes (short-term results of a project) and impacts (long-term changes, at least partially induced by the project). On a general basis, while final indicators are better for assessing changes in overall well being, intermediate indicators can provide cost-effective and useful information during, or soon after, the implementation of a project. Having made this distinction, the study goes on to identify a key set of indicators that could be used to monitor the effects of environmental factors on health and poverty (see table 1). These indicators were chosen because they are the most commonly used in the literature on natural resources and environmental health problems.

A few comments are required regarding the use of these indicators. First of all, the list of indicators presented in table 1 is not meant to be exhaustive. Secondly, this study does not suggest that all the indicators listed should be monitored for each project. The specific indicators to be used for a project should be chosen according to the following main criteria: local conditions, data availability, cost effectiveness, potential to track progress towards planned goals, local stakeholders' perception and acceptance of the indicator. Thirdly, whenever possible data should be disaggregated by income or wealth quintiles, as this allows a more accurate understanding of how the poor are impacted. Finally, given the complexity of the relationship between poverty and environment, care is always needed in the interpretation of the information provided by these indicators.

To address some of the problems mentioned above, the World Bank's study suggests the use of the pressure-state-poverty-response (PSPR) framework, which helps to identify the most appropriate indicators for the understanding of each specific situation, and to interpret the information provided by the indicators themselves. The PSRP framework, a modified version of OECD's pressure-state-response (PSR) model, allows us to track the impact of pressure factors not only on natural resources but also on the poor, and to identify the policy measures required to improve the relationship between poverty and natural resource use.

**Table 1**

| Indicator                                       | Definition   | Type         | Sources of data  |
|---|--|--------------|------------------|
| <i>Environmental health indicators</i>          |  |              |                  |
| <i>Access to safe water (private or public)</i> | Proportion of population who use any of the following types of water supply for drinking: piped water, public tap, bore hole/pump, protected well, protected spring, rain water                    | Intermediate | MICS, DHS, WDI   |
| <i>Access to sanitation (private or public)</i> | Proportion of population, who have within their dwelling or compound: toilet connected to sewage system, any other flush toilet (private or public); improved pit latrine; traditional pit latrine | Intermediate | MICS, DHS, WDI   |
| <i>Hours/day of available piped water</i>       | Hours per day of piped water available in rainy and dry seasons  | Intermediate | LSMS             |
| <i>Quantity of water used per capita</i>        | Volume of water collected by or delivered to the household and used there for  | Intermediate | Population based |

|   |   |              |                                   |
|---|---|--------------|-----------------------------------|
| <i>per day</i>  | drinking, cooking, bathing, personal and household hygiene and sanitation divided by number of persons in sample households <sup>2</sup>  |              | surveys                           |
| <i>Time taken/ distance involved in collecting water</i>  | Distance / time taken to walk to nearest source   | Intermediate | Population based surveys<br>LSMS  |
| <i>Percentage of child caregivers and food prepares with appropriate hand washing behaviour</i> | Appropriate hand washing behaviour includes critical times (after defecation and cleaning baby bottoms; before food preparation, eating and feeding children) and technique (uses water, uses soap or ash, washes both hands, rubs hands together at least 3 times, dries hands hygienically) | Intermediate |                                   |
| <i>Percent of residents using traditional fuels</i>   | Proportion of population using firewood, dung and crop residues as primary fuel for cooking and heating   | Intermediate | LSMS                              |
| <i>Percent of households having at least insecticide treated net</i>                            | Number of household having at least one treated bed net divided by total number of households visited x 100   | Intermediate | Community surveys                 |
| <i>Infant mortality rate</i>  | The number of deaths to children under 12 months of age per 1,000 live births.  | Final        | MICS, DHS, WDI                    |
| <i>Under 5 mortality rate</i>   | The number of deaths to children under five years of age per 1,000 live births  | Final        | MICS, DHS, WDI                    |
| <i>Prevalence of diarrhoea</i>  | Percent of surviving children under three, four, or five years old (depending on the country) who had diarrhoea in the two weeks preceding the survey, based on mothers' reports concerning the presence of loose stools  | Final        | DHS                               |
| <i>Prevalence of acute respiratory infection</i>  | Percent of surviving children under three, four, or five years old (depending upon the country) who had a cough accompanied by rapid breathing in the two weeks preceding the survey, as defined and reported by the mother   | Final        | DHS                               |
| <i>Malaria death rate</i>   | Total number of malaria deaths (probable or confirmed) per year among target group divided by mid-year population of the same target group  | Final        | DHS, DSS, Health facility surveys |
| <i>Disability adjusted life years</i>   | Life years lost due to premature death and fractions of years of healthy life lost from illness or disability   | Final        |                                   |
| <i>Poverty and natural resource indicators</i>  |   |              |                                   |
| <i>Percent of rural population below poverty line</i>   | Percent of rural population living below the national poverty line  |              | WDI                               |
| <i>Time spent by household members to collect water and fuel wood</i>                           | Total time spent by each household member to collect water and fuel per day X no. of household members X no. of days per year   |              | LSMS, Population based surveys    |
| <i>Distance walked by household members to collect water and fuel wood</i>                      | Distance walked by each household member to collect water and fuel per day X no. of members X by number of days per year  |              | LSMS, Population based surveys    |
| <i>Quantity of annual household consumption derived from common lands</i>                       | Quantity of key minor forest produce consumed per season  |              | Population based surveys          |



|  |  |  |                              |
|--|--|--|------------------------------|
| <i>Quantity of annual household consumption that is derived from forest products and fisheries<sup>1</sup></i> | Quantity of key minor forest and aquatic produce consumed per season   |  | Population based surveys     |
| <i>Per capita rural cereal production</i>  | (Cereal yield per hectare X land under cereal production )/ rural population   |  | WDI                          |
| <i>Percent of rural children under five who are underweight</i>  | Percent of children under 5 whose weight measurement is more than 2 standard deviations below the median reference standard for their age    |  | DHS Population based surveys |
| <i>Percent of rural children under five who are stunted</i>  | Percent of children under 5 whose height measurement is more than 2 standard deviations below the median reference standard for their age    |  | DHS Population based surveys |
| <i>Percent of rural children under five who are wasted</i>   | Percent of children under 5 whose weight measurement is more than 2 standard deviations below the median reference standard for their height |  | DHS Population based surveys |
| <i>Households rendered homeless from floods/hurricanes/cyclones per year by income / wealth quintiles</i>      | Total number of households with their primary source of dwelling destroyed as a result of natural disasters per year                         |  | Population based surveys     |
| <i>Number of deaths from natural disasters by income / wealth quintiles</i>                                    | Total number of deaths caused from natural disasters per year  |  | Population based surveys     |
| <i>Percent of farmers with land on slopes by income / wealth quintiles</i>                                     |  |  | Population based surveys     |

*Notes:*

MICS: Multiple Indicator Cluster Survey, supported by UNICEF and carried out by national governments

DHS: Demographic and Health Surveys, supported by USAID and carried out by Macro International

WDI: World Development Indicators, World Bank

DSS: Demographic Surveillance Systems

LSMS: Living Standards and Measurement Surveys, supported by World Bank

*Relevant publications:*

Shyamsundar, P. (2002) *Poverty-Environment Indicators*, Environmental Economics Series, Paper No. 84, World Bank, Washington D.C.

## PEP - Assessing Environment's Contribution to Poverty Reduction

The Poverty Environment Partnership (PEP) is an informal network of development agencies, established in September 2001, which seeks to improve the coordination of work on poverty reduction and the environment within the framework of internationally agreed principles and processes for sustainable development. The PEP advocates that natural resources can help lift the poor out of poverty, however, to pursue this goal, we need to improve our understanding of the linkages between environmental management and poverty reduction. One way to do so is by expanding and improving the range of indicators and assessment methodologies on the linkages between environmental resources and livelihoods we have at our disposal, some of which are here briefly reviewed.

- Five indicators were chosen to assess progress towards achieving target 9 of MDG 7:
  1. proportion of land area covered by forests
  2. ratio of area protected to maintain biological diversity to surface area
  3. energy use per \$1 GDP
  4. carbon dioxide emissions (per capita) and consumption of ozone depleting chlorofluorocarbons
  5. proportion of population using solid fuels

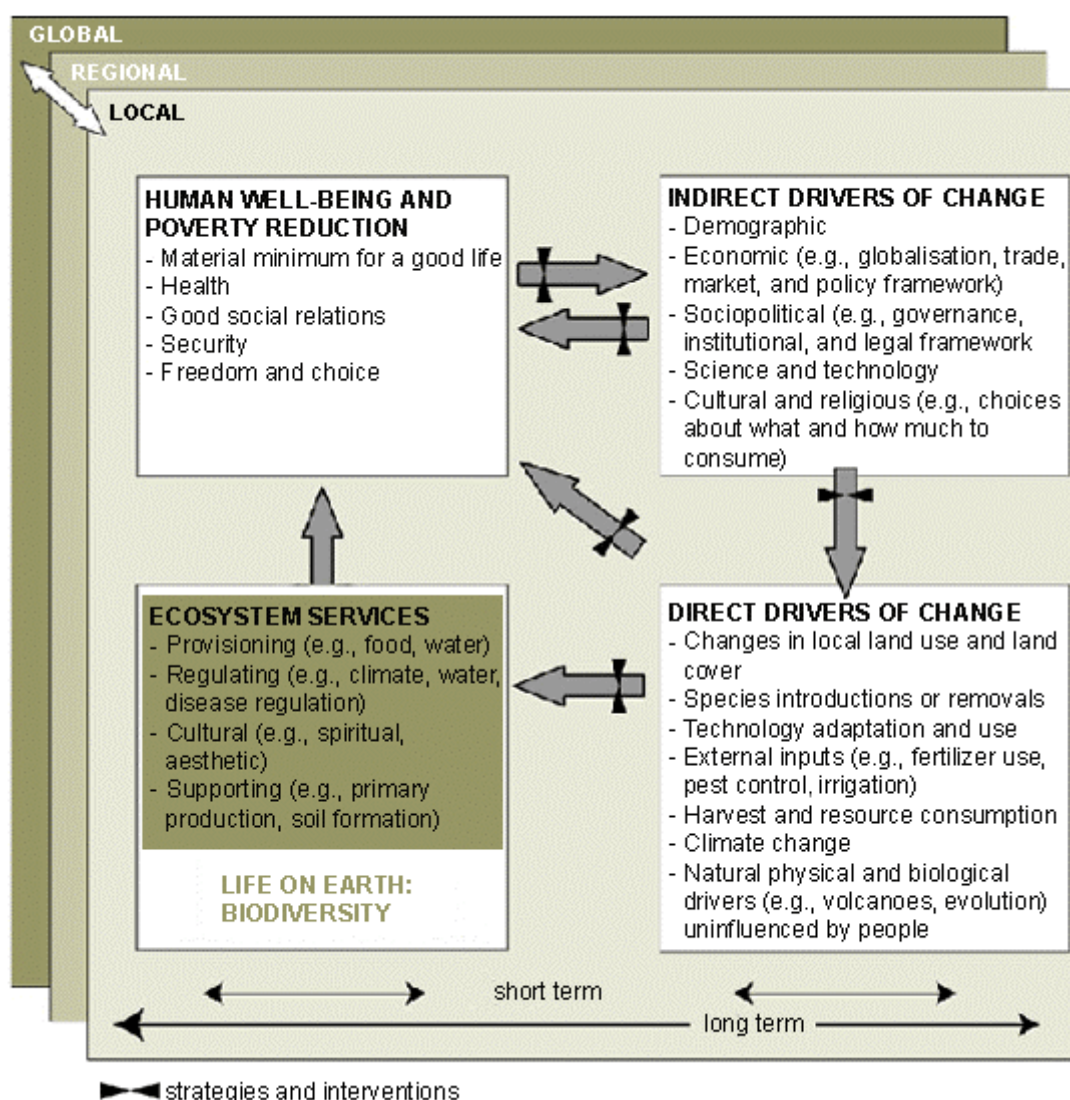
All these indicators are unquestionably key in assessing progress towards goal 7 of ensuring environmental sustainability, however, improvements could be made on the way these indicators are defined, and on the collection of data at the national and sub-national level.

- Another way to assess environmental and human well being is through the framework developed for the Millennium Ecosystem Assessment (MA). The MA team developed a framework around the following components: ecosystem services, direct drivers of change, indirect drivers of change, and human well being and poverty reduction (see figure ). This framework aims to support the development of strategies, policies and practices that lead to increases in ecosystem services, which in turn support improvements in human well being. These interventions can take place at local, national, regional and global level, and can influence ecosystem services in the short and long term. It is important to notice that there are different categories of ecosystem services:
  - provisioning services (fresh water, fuelwood, genetic resources, etc.)
  - regulating services (water regulation, climate regulation, etc.)
  - cultural services (educational, spiritual, etc.)

A country can trawl through these categories to choose a set of indicators that are the most appropriate for their own evaluating needs.

- A number of indices have been developed by international organisations to increase our understanding of how environmental resources relate to human well being. The most well-known are the Environmental Sustainability Index, the Ecological Footprint, Adjusted Net Savings, and a Measure of Comprehensive Wealth. All these indices certainly provide useful information, however, none of these seem to be able to fully meet the criteria for integrating environmental resources (ecosystem services) within a sustainable development context.
- In response to the recommendations from the first World Summit on Sustainable Development a number of environmental assessment techniques have been developed. Many countries now use one or more of these methodologies, the most well known of which are: Environmental Impact Assessments, Strategic Environmental Assessments, Sustainability Appraisals, and Ecosystem Assessments.

Figure. Millennium Ecosystem Assessment Conceptual Framework of Interaction between Biodiversity Ecosystem Services, Human Well Being, and Drivers of Change



Source: Millennium Ecosystem Assessment

*Relevant publications:*

Poverty Environment Partnership (2005) *Assessing Environment's Contribution to Poverty Reduction*, UNDP, N.Y

Millennium Ecosystem Assessment (MA) (2003) *Ecosystems and Human Well Being: A Framework for Assessment*, MA, Washington, D.C.

## WRI - Environmental Indicators Relevant to Poverty Reduction

As part of its effort to develop a corporate environmental strategy, the World Bank commissioned to the World Resource Institute (WRI) the development of a background paper on spatially referenced poverty-environment indicators that could be used to target poverty reduction programs and to monitor their outcomes.

### *Methodologies and indicators developed*

In this study the authors argue that the development of indicators that are relevant both to poverty reduction and to natural resource use is auspicious, however such indicators should have the following characteristics:

1. Be disaggregated: national-level indicators do not provide sufficient information to understand how poverty and environmental conditions interact, or which actions to take to affect this relationship
2. Have a geographic framework: this is particularly important for three reasons:
  - a. Many environmental problems manifest themselves spatially
  - b. Maps showing both poverty and environmental data are a powerful tool to support geographic targeting of interventions and projects
  - c. Thanks to the advancements in software technology, maps have become affordable, feasible and a convenient way to store and analyse data from many different sources.
3. Link ecosystem goods and services to poverty outcomes: local and geographically referenced indicators can be used to develop poverty maps and maps of natural resource availability. These maps, when combined, provide a powerful tool to examine the poverty-environment linkages, even though extra care should be put in the interpretation of the information provided by these maps

Disaggregated spatially referenced indicators have great potential to improve our understanding of the relationship between poverty and the environment. The development of such indicators, however, requires significant additional effort in order to gather better data, and develop statistical interpolation methods to estimate missing values at a local scale.

WRI has put considerable effort in the past decade in developing spatially referenced environmental indicators, mainly through the implementation of the PAGE (Pilot Analysis of Global Ecosystems) project, and through its support to the Millennium Ecosystem Assessment, a scientific assessment of the state of the world's ecosystem. These projects have delivered conflicting results. On one hand, they have highlighted the benefits of producing an integrated assessment of ecosystems (like having a map of ecosystem extent, and having at least an idea of the degree of change within ecosystems). On the other hand, they made clear that the information needed for an accurate assessment of ecosystem goods and services is often lacking, and, even when this is available, we lack the scientific understanding to interpret how changes in ecosystems will affect the goods and services generated and how these will, in turn affect the livelihoods of the poor. In addition, the development of sound spatially referenced environmental indicators is made difficult by the site specific qualities of ecosystems.

In conclusion, the authors argue that the development of geo-referenced indicators is auspicious, because only a spatially specific approach that integrates economic, social, demographic and environmental data is likely to improve our understanding of the relationship between poverty and natural resource use; however the development of such indicators will require a significant further investment in data collection, conceptual development and analysis, in order to overcome the following challenges:

- the multidimensionality of poverty
- the general lack of environmental data
- the complexity of the relationship between natural resource management and poverty outcomes

### *Relevant publications:*

Henninger, N. and Hammond, A. (2002) *Environmental Indicators Relevant to Poverty Reduction*, Environment Strategy Papers No 3, World Bank, Washington D.C.

## ***Appendix C – Poverty Mapping***

## WRI - Where are the Poor?

Despite what might be suggested by raw poverty data, poor people are not homogeneously distributed in a country at the national, regional or district level. Having realised this, poverty mapping is becoming an increasingly important tool for governments, donors, and NGOs who want to better target investments in human development, as it allows to combine poverty data with geographic information.

Poverty mapping, which can be defined as ‘the spatial representation and analysis of indicators of human well-being and poverty’, offers numerous advantages, such as:

- It can highlight the distribution of many assets which are key to poverty reduction, like availability of agroecological resources, road networks, etc.
- It provides a means for integrating biophysical information with socio-economic indicators, to obtain a more comprehensive picture of human well-being
- Maps are a powerful tool for presenting information to non-specialists (e.g. politicians and decision-makers)

Higher resolution poverty maps are the most interesting for environmental scientists, and other researchers working on topics that have an important locational aspect, like land cover change, distribution of ecosystem goods and services, infrastructure development, etc. At the moment, there is no standard methodology for producing high-resolution poverty maps. A commonly used method is called ‘small area estimation’. The poverty maps based on this method rely on the data coming from a census and from a survey sample representative of the overall population, and on sophisticated econometric techniques and the use of a set of identical variables (e.g. household characteristics and educational background). Other poverty mapping methods are based on the use of composite indexes, like the HDI. Composite indexes have the advantage of requiring less advanced statistical expertise than small area estimation, but their weighting of variable can be arbitrary.

Highlights of use and impact of poverty mapping:

- Poverty maps have become important tools for implementing poverty reduction programs (e.g. poverty mapping is influencing investment in several sectors)
- Poverty maps are being used to improve targeting of public expenditures (e.g. the World Bank has heavily invested in developing a new road network for Guatemala, after poverty maps revealed a high correlation between poverty and lack of roads). It should be noted, however, that some decision makers have shown resistance to this approach, since targeted approach to poverty do not have the same returns, in terms of electoral benefits, as universal approaches
- Maps are very important tools in emergency response and food security interventions (e.g. poverty mapping was successfully used in South Africa to combine information on sanitation and safe water supply to develop a strategy to contain a cholera outbreak)
- Poverty maps have helped decision-makers not only at the national, but also at the state/local level
- Producing and distributing poverty maps has also helped raising awareness of poverty in numerous countries

Further considerations:

- There is still unexplored potential for environmental and other applications
- NGOs and the private sectors are becoming increasingly interested in using poverty maps for their activities
- To build poverty maps researchers need to overcome problems of data availability, access and quality
- The support of senior level officials, and the collaboration between different agencies, are essential for the success of poverty map production and use
- Poverty mapping has had a strong impact on institutional strengthening in developing countries

*Relevant publications:*

Henninger, N. and Snel, M. (2002) *Where are the Poor? Experiences with the Development and Use of Poverty Maps*, WRI, Washington D.C.

## WRI - Mapping and Geographic Analysis of Human Welfare and Poverty

The aim of this document is to provide a comprehensive review and assessment of activities in the area of mapping and geographic analysis of human welfare indicators.

When geographically disaggregated data (e.g. urban vs. rural areas) obtained from poverty assessments are displayed on a map we obtain a 'poverty map'. Poverty maps are a very useful tool, as they can provide information on the spatial distribution of poverty. Some of the advantages of poverty maps are that:

- poverty maps allow integration of data from various sources
- having a spatial framework allows to switch to different units of analysis (e.g. from administrative to ecological boundaries)
- poverty maps allow to identify spatial patterns, which can provide new insights into the causes of poverty
- targeting of resources can be improved
- poverty maps can support efforts to decentralise decision making
- poverty maps are a powerful visual tool that can be very effective in reaching policy makers and the wider public
- internationally comparable poverty maps can improve strategic planning of international development organisations

### Human welfare and poverty

A fundamental problem at the base of mapping rural poverty has to do with the measurement of human well-being. The measurement of human well-being is a difficult exercise, which raises many methodological issues, starting from the fact that there is no universally agreed upon definition of poverty. Defining poverty is important because it determines how poverty can be measured. More specifically, in order to measure poverty four questions need to be answered:

1. How do we define human well being?
  2. What do we measure?
  3. At what level of well being is a person poor?
  4. How do we aggregate poverty measurements, both along one dimension and along different dimensions of well being?
1. Most authors today agree that poverty has many dimensions and that it can be defined in terms of a lack of well being
  2. There are basically two methods to develop indicators of human well being and poverty:
    - I. We can measure the means or inputs of human well being (e.g. food consumption)
    - II. We can measure well being itself (e.g. nutritional status, life expectancy, literacy rate)
  3. Whether analysts choose to use an economic or a social measure of well being, they need to identify a threshold to distinguish the poor from the non-poor. For social indicators it is usually a specific threshold of deprivation (e.g. poor nutrition). For economic indicators this threshold is usually referred to as a poverty line. Since different countries use different approaches to draw a poverty line, international comparisons of these poverty lines require careful consideration of the definition used
  4. Once a threshold for human well being has been established, there are two aggregation problems, the first dealing with aggregating household data along a single dimension, and the other with combining various indicators measuring different dimensions of well-being. The second problem is often resolved creating composite indexes which combine the various indicators.

Most indicators of human welfare and poverty can be grouped into three major dimension of well being:

- Economic (current consumption, expenditures, income)
- Social (nutrition, sanitation and water, energy, health and family planning, education)
- Enabling environment (access to means of production, vulnerability, peripheral areas)

Since many of the poverty indicators that fall in the previous categories, and that can be used to map poverty, measure different dimensions of human well-being, households identified as poor by one indicator might not be classified as poor according to another indicator. The choice of the poverty indicator to be used thus influences which households (or regions) are classified as poor.

### Peripheral Areas

Peripheral areas can be defined as isolated areas where poverty is largely determined by geographic factors. Analysts generally provide two types of explanations for this spatial clustering of poverty: individual and structural. Individual explanations refer to human capital (e.g. education) and availability of productive resources. Structural explanations focus on structural factors that constraint opportunities (e.g. limited job opportunities). Typically, either one or a combination of individual and structural factors are identified as causes for poverty and its spatial concentration. The degree to which individual or geographic factors are causing poverty has implications for developing a strategy aimed at improving the situation of the poor.

### Data collection and sources

The data collection method itself can determine the resolution of the poverty map and the type of analysis to carry out. The methods to collect data for poverty assessments can be grouped into two approaches:

1. Bottom-up approaches require active participation of the poor, incorporate their perspectives, and generally are more qualitative in nature. Bottom-up approaches have the advantage of allowing participants to apply their own criteria to define poverty, on the other hand they use relatively small samples that make it difficult to extrapolate results and compare different surveys.
2. Top-down approaches rely more on questionnaires, collect information via survey or census, and tend to be more quantitative in nature. While *census* data allow easy aggregation and a fine resolution, they provide only selected and sometimes outdated indicators of well being; *surveys*, instead, can provide more up-to-date and relevant indicators, but require additional processing and modelling efforts to overcome the limitations of small sample sizes and produce poverty maps of adequate resolution.

Some studies suggest that a combination of bottom-up and top-down approaches should be pursued. For example, participatory poverty assessments could be used for monitoring poverty in between major surveys.

A number of surveys provide internationally comparable data:

- Demographic Health Survey (DHS): this survey was established by USAID to provide information on fertility, health and morbidity. As of 1997 DHS surveys had been carried out in 59 developing countries.
- Living Standards Measurement Study (LSMS): this survey was established by the WB to improve the type and quality of household data collected by statistical offices in developing countries. It consists of three major modules: a household survey, a community level survey, and a price survey that tries to measure purchasing power. As of 1997 LSMS surveys have been carried out in 31 developing countries.
- Integrated Surveys (IS): this survey, similar to the LSMS, provides information assess impacts of structural adjustments on households.
- Priority Surveys (PS): is conducted more frequently and uses a large sample to ensure that all population groups are represented.

There are basically three approaches to produce sub national poverty maps.

#### 1. Mapping auxiliary data

Auxiliary data usually provide complete coverage of a country at various resolutions. Two different approaches can be used to map these data: 1) auxiliary variable can be mapped individually (e.g. average household income at district level); 2) auxiliary variables can be integrated with the help of the GIS to generate composite measurements (e.g. maps representing access, vulnerability and economic diversity).

The advantages of mapping auxiliary data are the good international availability of data, and the possibility of developing a typology of administrative areas, identified by certain characteristics of poverty, human welfare, and agricultural research. The disadvantages are the limited resolution and our limited understanding of the causes and effects related to poverty.

#### 2. Mapping survey data



Geo-referencing surveys, that is assigning a latitude and a longitude to a sampling point, can provide the following benefits:

- internationally standardised surveys (e.g. DHS) can be integrated across countries to obtain regional assessments
- the raw data can be plotted on a map to reveal spatial patterns of the variable under investigation
- survey data can be integrated with other mapped data to produce new modelled estimates

Mapping survey data helps identify broad patterns in human development. However, this method cannot be used to characterise areas below the first sub national administrative level.

### 3. Mapping modelled results

This approach can be used to generate poverty maps with a high spatial resolution, which are very useful for targeting interventions and analysing the causes and effects of poverty. To be implemented, this approach requires:

1. data that are geo-referenced and can be disaggregated at large scale
2. a system, usually a GIS, that allows to integrate different data sets spatially
3. statistical methods to estimate missing values at local scale (e.g. small area estimation)

Researchers at CIAT have developed a method to extrapolate from local participatory assessments to a larger geographic area, thus making local perceptions of poverty the basis for poverty assessments. Their method (described in Ravnborg *et al* 1997) includes the following steps:

- select sampling sites
- conduct well being rankings within the selected communities
- group households into average well being categories
- extrapolate well being rankings from sample communities to the entire study area
- quantify well being indicators, develop a questionnaire, and draw a representative sample for the entire population of the study area
- further steps can include developing a single composite well being index and use it to produce a regional poverty profile

### Final comments:

- Very few developing countries collect data that can be used to reliably map poverty
- Detailed modelling of poverty estimates at the village or community level is most appropriate for narrow geographic targeting and for studying and understanding the complex relationships between land use, environment and poverty
- Producing high resolution poverty maps requires close collaboration with national organisations and improved technical capacity to carry out complex quantitative analyses and modelling
- Knowing where the poor live provides no information about why they are poor. The concentration of the poor generally results from a combination of structural and individual factors.

### Relevant publications:

Henninger, N., (1998) *Mapping and Geographic Analysis of Human Welfare and Poverty: Review and Assessment*, WRI, Washington D.C.

Ravnborg, Helle Munk con la colaboración de María del Pilar Guerrero (1997), *Evalucación de Pobreza Rural: Un Método Práctico para Extrapolar y Cuantificar Percepciones Locales*, Edición para Curso, CIAT, Cali

## UNEP-WCMC - Forest and Poverty Mapping in South Asia

An example of how poverty mapping can be used to study the relationship between poverty and the environment is provided by UNEP-WCMC and its project: 'Forest and Poverty Mapping in South Asia'. The aim of this project, carried out between 1999 and 2000, was to map indicators of poverty and population pressure, and to combine this information with maps of forest cover, protected areas, biodiversity hotspots, etc.. The maps thus developed can be a very useful tool for decision makers who want to identify priority areas for action for the development of the forestry sector.

As expected, the choice of indicators was a critical phase in this project. This choice was largely determined by data availability and by the need to use consistent indicators at the regional level for the purpose of national comparisons. The indicators that were eventually selected were: forest cover, deforestation rates, wood production, threatened species as % of the total, traditional fuelwood use, debt/service ratio, human development index, education, health, economic well-being, population growth, population density, rural population. These indicators were then combined in various ways to create indices. The reason for this is that, while mapping individual indicators is certainly useful, indices are better at showing possible correlations between poverty and environment factors, which were the focus of this study. The indices developed were the following:

- Regional indices of deforestation risk: forest cover and resource use, forest cover and the human development index, forest cover and population pressure
- National indices of development status: population growth and education, population growth and health, population growth and economic well-being

To develop these indices each indicator was scaled from 0 to 1 and then combined and averaged. Once created, these indices can be overlapped on a forest cover map and endangered forest areas can be identified. As part of this project, maps were produced in digital form and put on an Internet Map Server (IMS), designed to offer users the possibility of producing their own maps by combining and mapping the indicators and indices of their choice.

A few comments on the usefulness of poverty mapping to explore poverty-environment linkages can be drawn from the analysis of this project:

- This methodology can be used to identify priority forestry areas for conservation and/or development interventions. However, whenever possible this information should be combined with other considerations to become more meaningful
- Data availability is the stronger limit to the successful implementation of a poverty and forestry mapping effort. In this project, data availability strongly influenced both the choice of indicators and the level of disaggregation possible
- Combining indicators to develop indices allows to explore possible correlations and trends between different factors; however, caution is needed in drawing conclusions especially on causal relationships.

More information about this project can be found at:

<http://www.unep-wcmc.org/forest/poverty/index.htm> (last accessed 12 December 2006)

## World Bank – Mapping Poverty

The last few years have witnessed an increased tendency from researchers to develop and use geographically disaggregated indicators that provide information about the spatial distribution of poverty. These datasets, often referred to as ‘poverty maps’, have many advantages:

- They uncover the geographic variations in the incidence of poverty (or any other factor under consideration) within a country, which are often hindered by aggregate, national level indicators
- They allow to display simultaneously different factors on the same map
- They help identifying geographic factors that may influence poverty (e.g. access to markets)
- They support geographic targeting of resources and development interventions. Furthermore, once an intervention has been decided they can be useful for designing the intervention itself
- Finally, they are a very powerful visual tool and, as such, they facilitate the communication of information to a non-specialist audience, like decision makers and the local community. In this sense, poverty maps can become an instrument for local empowerment.

A precondition for mapping indicators at a higher geographic resolution (e.g. administrative level) is the availability of data at this resolution. Unfortunately, detailed geographic information on socio-economic indicators is often difficult to obtain. Usually the best sources of this type of information are censuses and surveys:

- Censuses are a time consuming and expensive exercise, as they usually involve the whole population of a country. For these reasons they are carried out rarely (once a decade in most countries) and the number of indicators they provide is very limited
- Surveys are conducted on a relatively small sample of households or individuals, therefore they can be performed more frequently than censuses, and they provide a much more detailed picture of the well-being of the sampled population, possibly resulting in several hundreds indicators (examples of comprehensive household survey programs are the World Bank’s Living Standards Measurement Surveys (LSMS) and the USAID funded Demographic and Health Surveys (DHS))

Given their characteristics, neither censuses nor surveys provide sufficient information on people’s well-being at a high resolution. However, statistical methods like the small area estimation can be used to combine the depth of information in a survey, with the complete spatial coverage available from a census, to indirectly estimate the value of indicators of well-being for small areas. The small area estimation approach involves determining the relationship between an indicator studied in an household survey and one of the variables found in a national census. The analyst can then use this relationship to map the survey’s welfare indicator onto the detailed geography offered by a national census.

Additional source of information for poverty maps are:

- Administrative data: administrative data can be a very useful source of information on schools, roads, health facilities, etc.
- Auxiliary data sources: analysts can use GIS (geographic information systems) to extract information from global geographically referenced datasets, to construct indicators that are not otherwise easily measured (e.g. an indicator on access to markets can be inferred by information on the road network, public transport and location of markets)
- Aggregate indicators: geographical analysis of poverty can be based, instead than on individual indicators, on a combination of indicators. Indices, like UNDP’s HDI, recognize the multidimensional nature of poverty and provide composite measures of human well-being; however, there is no defined way to significantly combine indicators.

### *Relevant publications:*

Deichmann, U. (1999) *Geographic Aspects of Inequality and Poverty*, World Bank, Washington D.C.

## IUCN – Poverty-Conservation Mapping

The possible applications of poverty-conservation mapping were debated at the 3<sup>rd</sup> IUCN World Conservation Congress held in Bangkok in 2004, which aimed, among other things, at discussing new ways to explore the complex relationships between development and people.

Maps are definitely a useful tool to explore the linkages between conservation and poverty, as proven by the growing number of poverty-environment mapping applications, like assessing the patterns between land cover change and human migration in Ecuador, or analysing food insecurity in Cambodia.

Strengths of poverty-conservation mapping:

- poverty-environment maps uncover spatial correlations and disparities between the factors under consideration
- spatial models can help understand the causal relationships between the variables involved (even though additional information is needed before any conclusion can be reached)
- digital maps are a useful way for storing information
- maps are powerful communication tool

Weaknesses of poverty-conservation mapping:

- generating maps is time consuming and expensive
- maps can quickly become outdated
- it is often difficult to obtain access to the necessary data
- there are cultural differences in the way people understand information provided in maps

Congress' participants also discussed poverty-conservation applications potentially useful for IUCN and its members. Among the ones identified were the following:

- Highlight the importance of the role played by biological resources in food security
- Evaluation of the impacts of biological invasive alien species
- Identification of areas that are vulnerable to infectious disease outbreaks
- Geographic targeting of resources

Furthermore, congress' participants recognised the importance of using existing databases to support the development of poverty-conservation maps, like:

- World Database on Protected Areas
- Red List of Threatened Species
- ECOLEX
- The Ramsar Convention's list of Wetlands of International Importance
- BirdLife's International Important Bird Areas database

### *Relevant publications:*

Snel, M. (2004) *Poverty-Conservation Mapping Applications*, paper delivered at the IUCN World Conservation Congress, 17-25 November 2004

Katariya, V., de Sherbinin, A., Oviedo, G., Wagner, M. (eds) (2005) *Poverty-Conservation Mapping: The Geography of Poverty and Biodiversity*, UNEP, GRID Arendal, ADB, Cooperazione Italiana, IUCN

## CIESIN – Global Poverty Mapping Project

CIESIN (Center for International Earth Science Information Network) recently launched an initiative called 'Global Poverty Mapping Project' which has two main objectives:

- Improve our knowledge of the global distribution of poverty and our understanding of the relationship between poverty and geographic factors
- Support sound decision-making in the design of interventions aimed at reducing poverty

So far, a lot of the work carried out by CIESIN has involved finding the appropriate data sets at the global and national levels:

- Global poverty data sets: CIESIN has built global datasets of poverty using infant mortality and child malnutrition data, which are proxies for human well-being. These data were mainly drawn from Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), national Human Development Reports (HDRs).
- National poverty data sets: at the national level human well-being has been measured by CIESIN's analysts through the use of proxy variables (e.g. access to water, housing education) and direct and indirect estimation techniques.

□ Indirect estimation techniques:

- Small area estimation: this methodology uses sophisticated statistical and econometric techniques to combine information derived from surveys and censuses, in order to produce reliable estimates of poverty for small geographic areas. The spatial information is usually separated from the data before the analysis, and reconstructed once the estimates have been generated.
- Other techniques: new techniques, made possible by the progresses in computing technology, have been developed to estimate poverty for small geographic areas by combining proxy variables with satellite data.

- Direct estimation techniques: in the majority of countries (especially developing countries) measures of income and well-being are available only at the national level. However, when the information made available by a survey is sufficiently rich, it can be used to generate sub-national indicators of well-being. These basic needs indicators are built by combining all the information collected during the survey at the household level (e.g. education, housing conditions, access the water, etc.) into a composite indicator of well-being for small administrative areas, and then linking these to spatial information.

Though only recently launched, CIESIN's Global Poverty Mapping Project has already delivered a number of outputs:

- Spatial analysis approaches have been used in a number of countries (i.e. Mexico, Ecuador, Kenya, Malawi, Bangladesh, Sri Lanka and Vietnam) to examine the relationship between poverty and geographic factors, and to generate food security and welfare estimates for sub national areas.
- A study of how poverty maps can be used to explore the relationship between protected areas and poverty (de Sherbinin 2006)
- A new compendium of poverty maps which aims at improving our understanding of the spatial distribution of the poor, and of the root causes of poverty (CIESIN 2006). This compendium is the result of a collaborative effort between CIESIN and the World Bank, who have collected a vast amount of spatially referenced data on three key indicators of human development (hunger, child mortality and income poverty) at four scales (global, continental, national and local. The results are new poverty maps that offer two important advantages: the maps show the roles of distance topography, disease, ecology, climate zones and other geographical features in affecting the location and extent of poverty; the maps allow a more efficient targeting of development interventions.

*Relevant sources:*

CIESIN's Website:

<http://www.ciesin.columbia.edu/povmap/>

CIESIN (Center for International Earth Science Information Network) (2006) *Where the Poor Are: An Atlas of Poverty*, Columbia University, New York

de Sherbinin, A. (2006) *Protected Areas and Poverty: Selected Descriptive Statistics*, unpublished document, CIESIN

## ***Appendix D – Participatory Approaches***

## **BirdLife - Framework for Monitoring Poverty Reduction Impact of Site-Based Projects**

In 2004 BirdLife launched a ten year strategy for the conservation and sustainable management of Important Bird Areas (IBAs). This strategy identified 12 specific objectives, one of which is to 'Promote and foster the links between biodiversity conservation and sustaining people's livelihoods'. In order to achieve this objective, it is important for BirdLife to improve their understanding of the interactions between habitat conservation and local people's livelihoods, and to demonstrate, possibly in a quantifiable way, how conservation projects carried out in IBAs can contribute to alleviate poverty among local communities. To this end, BirdLife is developing a monitoring framework to assess the impact of its work on poverty reduction in a meaningful, replicable and cost-effective way.

BirdLife's framework to monitor the socio-economic impacts of site-based projects was developed based on the following main considerations:

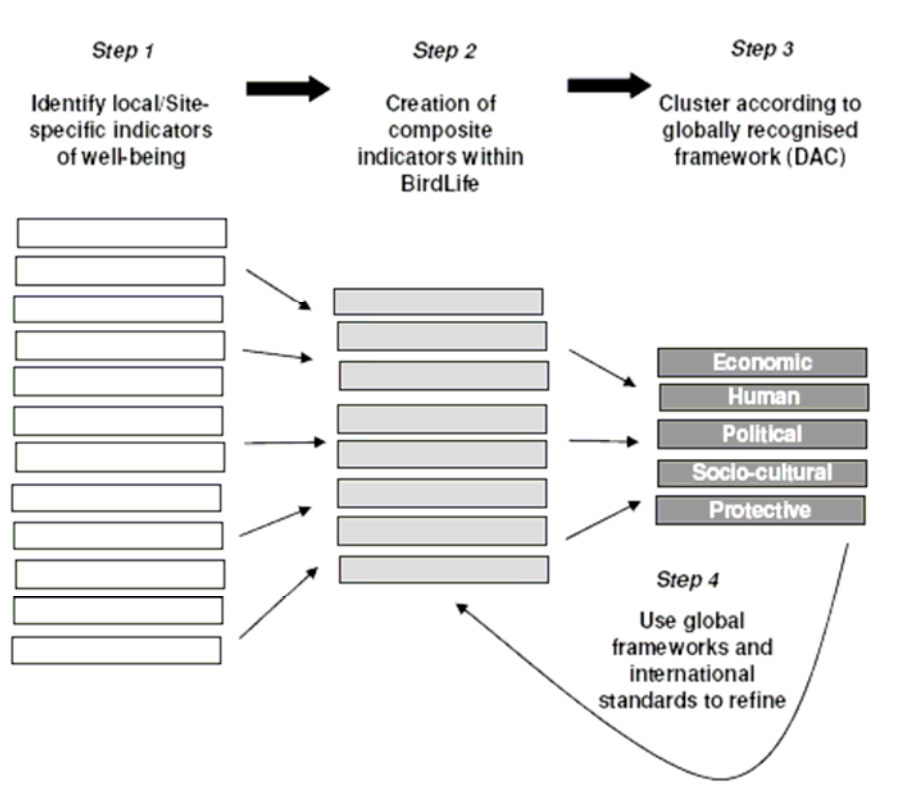
- Poverty has many dimensions – during the last decades numerous studies and debates have contributed to an improved understanding of poverty, which the international community now agrees on defining not just in terms of income. In particular, BirdLife has adopted the widely used OECD DAC guidelines on poverty reduction, which define poverty according to five core dimensions: economic, human, political, socio-cultural and protective. According to BirdLife's vision, empowerment and rights should be seen as a fundamental dimension of poverty
- Participation is a key element in the identification and measurement of indicators because:
  - It ensures that what is being measured is truly relevant to local people
  - It contributes to empowering local people
  - It increases the explanatory power of indicators, as indicators are more intrinsically linked to the specific local context
  - It minimises the influence of any outside agenda
- Indicators should be developed based on the livelihoods approach
- Indicators should be developed locally, to reflect issues connected with a specific situation, but it should be possible to aggregate them at the national, regional and global level – this scaled approach represents one of the main strengths of BirdLife's monitoring framework, as it allows to effectively interrelate the local and the global level and facilitates communication between local communities and decision makers
- Time, effort, and cost are important variables – over 7,000 IBAs have already been identified (and this number is expected to grow to over 10,000), it would therefore not be feasible to carry out a very detailed assessment for all of them

Based on these considerations, BirdLife has developed a monitoring framework characterised by the following components:

1. *Step 1:* Use of PPA (Participatory Poverty Assessment) to identify poverty indicators relevant to poor people and to the specific environmental context. A set of guidelines for PPA at IBAs has been produced to support partners during the implementation of projects
2. *Step 2:* Grouping community-defined indicators under a set of composite 'indicator classes'. The goal is to produce a set of 12-20 composite indicators, under which all indicators produced at the local level can be grouped
3. *Step 3:* Classification of the composite indicators under one of the OECD DAC core dimensions of poverty (economic, human, political, socio-cultural, and protective capabilities). Ideally, the indicators should be expressed quantitatively in terms of number of people per households, so the impacts at each level can be easily summed
4. *Step 4:* Refine composite indicators to ensure they effectively capture the breadth of poverty-environment issues of interest to the poor.



Figure 1. Framework to monitor human well-being for site-based projects



BirdLife recognizes that there are various aspects of this approach requiring further examination, such as:

- Empowerment is a key indicator in the monitoring framework, but, since it affects all dimensions of poverty, it probably merits more studying, understanding and consideration
- There is a need to differentiate impacts according to social groups, and, in particular, to gender

While these and other issues certainly deserve further examination, by increasing the comprehensiveness of the approach the risk is ending up with a very sophisticated framework that is too complex to be easily implemented by local people.

The approach outlined above was tested at few sample sites. One result of this pilot phase was that people identified indicators mainly belonging to the economic and human dimensions of poverty. There are various reasons for this:

- These are the most common dimensions of poverty and their predominance reflect local people's (and local partners') familiarity with them
- The lack of experience of partner organisations in carrying out PPAs
- Communities tend to focus on status indicators, rather than enabling conditions and social capital indicators

A way to avoid the prevalence of indicators referring to the economic and human dimension of poverty is to provide more specific PPA guidelines.

#### *Relevant publications:*

BirdLife International (2006) *Monitoring the Socio-Economic Impacts of Projects at IBAs: A Global Framework*, version 0. Unpublished draft

Fanshawe, J. and Thomas, D. (2005a) *Developing an Approach for Monitoring the Contribution of BirdLife's Local Work to Human Well-Being and Poverty Reduction*, BirdLife International (unpublished discussion paper)

Fanshawe, J. and Thomas, D. (2005b), *Basic Framework for Monitoring Poverty Reduction Impact at IBAs and Projects*, BirdLife International (unpublished discussion paper)

## **IUCN, WWF, CIFOR - Assessing the Outcomes of Conservation and Development Interventions at the Landscape Level**

A collaborative effort between IUCN, WWF and CIFOR has led to the development of a conceptual framework aimed at assessing both livelihoods and biodiversity outcomes of conservation activities at the landscape level.

This approach is based, on one hand, on the capital assets framework, and, on the other, on participatory techniques. The rationale behind the adoption of the capital assets framework is that the long term well-being of people is determined by the benefits that flow from five capital assets: human, social, built, financial, and local natural assets. In addition to this set of capital assets, which are the ones used also in the sustainable livelihoods framework, the authors of this study found it necessary to add a sixth category, called 'global natural (or environmental) assets', which includes those attributes of the natural capital that do not provide benefits for local stakeholders. The adoption of participatory techniques to identify appropriate indicators for each capital assets finds its justification in the idea shared by many that only local stakeholders really know how and whether they benefit from conservation interventions. In addition, the involvement of local people in these processes often leads to a wider range of benefits for the project (e.g. increased support from local stakeholders).

The framework proposed is therefore a participatory process that identifies about 5 indicators for each of the following asset category:

1. Human assets (e.g. health, education, skills, opportunities, etc.)
2. Social assets (e.g. laws, regulations, traditions, etc.)
3. Built assets (e.g. infrastructure, road network, etc.)
4. Financial assets (e.g. income and employment characteristics)
5. Local natural assets (e.g. fertile soils, clean water, fuelwood, etc.)
6. Global natural (or environmental) assets (e.g. rare species, carbon stock, etc.)

The main components of this framework are:

- The use of a variety of standard participatory techniques to identify indicators (e.g. flash cards, drawings, historical trend analysis, participatory modelling, etc.). Large sets of potential indicators are initially identified; these are then refined until a set of 25-30 indicators is obtained.
- The use of a Linkert scale to assess each indicator. According to this method, 1 is assigned to the least desirable situation and 5 to the most desirable situation. Participatory methods are implemented to negotiate with the local stakeholders the scores to assign to the intermediate situations, trying to cover all possible outcomes over the life of the project.
- The results of this assessment are often presented using radar diagrams. Radar diagrams have the advantage of showing changes in situations without implying judgements on whether the changes are good or bad.

Main advantages of this conceptual framework:

- This is a relatively rapid assessment method
- The implementation of this framework provides 25-30 indicators in total, which experience suggests are enough to capture the most important outcomes, while still being manageable
- Participatory approaches can be built into conservation interventions with little extra cost, by re-designing already scheduled workshops and meetings

Main limits of this conceptual framework:

- Due to time and budgetary reasons, only a small number of the local stakeholders can actually be involved in the process
- The use of participatory techniques to identify indicators limits the possibility of comparing different projects

This framework developed by IUCN, WWF and CIFOR has the potential to greatly assist development and conservation organisations in monitoring the impact of conservation interventions on livelihoods and biodiversity at the landscape scale. More generally, this approach has proved to be useful in promoting greater understanding of the linkages between livelihoods and conservation at the local level, and in encouraging a process of continuous negotiation, adaptation, and improvement of the conservation intervention.

*Relevant publications:*

Sayer, J., Campbell, B., Maginnis, S., Sengupta, S. (2006) *How to Assess the Outcomes of Conservation and Development Interventions in Landscape Mosaic* (working draft), IUCN, WWF, CIFOR

Sayer, J., Campbell, B., Petheram, L., Aldrich, M., Ruiz Perez, M., Endamana, D., Nzooh Dongmo, Z., Defo, L., Mariki, S., Daggart, N., Burgess, N. (2006) 'Assessing Environment and Development Outcomes in Conservation Landscapes', Biodiversity Conservation

## **Wildlife Conservation Society - Assessing the Human Welfare Effects of Establishing Protected Areas for Biodiversity Conservation'**

The Wildlife Conservation Society (WCS) has been involved in the last few years in a significant effort aimed at assessing the human impact of protected areas. This work is based on the idea that documenting how conservation actions influence the welfare of local people is critical because it can help to demonstrate the benefits of conservation on local people, or to identify ways to minimize, and, whenever possible, avoid, negative impacts of conservation activities.

David Wilkie, together with colleagues from WCS and other organisations, summarised in a paper called 'Parks and People: Assessing the Human Welfare Effects of Establishing Protected Areas for Biodiversity Conservation' the main components that a study aimed at assessing the human impacts of PAs on local people should encompass. These guidelines were then further developed and are now being tested by WCS in 4 of the 13 recently established National Parks in Gabon. The first results of this study should be available in 2007.

Wilkie *et al* (2006) first of all identify the following as the main challenges to assessing the human impacts of PAs:

1. The value of natural resources varies hugely from household to household
2. Very rarely we have baseline data referring to the welfare of local households before a park was established. As a consequence the data we can acquire on households' present welfare loses a lot of its meaning, because we do not have anything to compare it to
3. To be significant, a study should track the changes in the welfare of some households located within a PAs over time
4. Finally, the changes in the welfare of households affected by a park should be compared to the changes, over the same period of time, in the welfare of 'control' households that, while being close to the park, are outside its area of influence

Based on these considerations, Wilkie *et al* (2006) suggest that studies aimed at assessing the human impacts of PAs should always:

- Track the changes in welfare of a statistically meaningful sample of families before and after (1, 3, 5, 10 years) the establishment of the park or reserve
- Study both families that were affected by the establishment of a park and 'control' families that were unaffected by the establishment of the park. Control households should be selected to match park-influenced households in all their basic characteristics
- Collect information both at the village and at the household level

Having established these as the fundamental components on which any research should be based, Wilkie *et al* (2006) proceed to give indications of *what* should be measured and of *how* the data should be collected. Here we present their main recommendations.

First of all, the authors identify health, wealth, income, consumption and access to services as the most important attribute of human welfare to track. As mentioned above, data on these factors should be gathered at both the village and the household level.

### 1. Village level factors

The most important factors that influence the welfare of families at the village level are: access to markets, access to natural resources, and availability of social services. A mix of participatory mapping and survey methods can be used to gather data on these factors. In particular:

- a. Market access can be measured in terms of travel distance or travel time from the village to the nearest permanent market, or by calculating the village price of a standard basket of goods
- b. Access to natural resources can be measured mainly through participatory mapping or through remote sensing image analysis
- c. Access to social services, again, can be simply measured recording the travel time or travel distance to the various services (water source, primary and secondary school, clinic and pharmacy)

### 2. Household level factors

The most important factors to assess household welfare are:

- a. Demographics – family size, age, and gender composition
- b. Education – highest education level attained by each family member
- c. Short-term health measures – interviews and anthropometric measurements
- d. Wealth – assets people own (measured through qualitative or quantitative measures)
- e. Income – revenues people generate from their labour and investments (measured through subject recall or subject self-reporting)
- f. Consumption – natural and manufactured goods that people obtain or buy (measured through direct observation, subject recall, subject self reporting)
- g. Social capital and social cohesion (measured through subject self-reporting)

These quantitative household surveys are based on the World Bank Living Standards Measurement Study (LSMS).

Data gathered from these village level and household level surveys, if comprehensively and correctly gathered, should allow to:

- Evaluate the contribution of natural resources to the welfare of families influenced by the park, and to the welfare of control families, and to track changes in these over time, as households become affected by the implementation of parks' regulations
- Compare the sources and levels of income of park-influenced and control households over time
- Assess (using the Gini coefficient) income, health, and consumption inequalities within and across households

*Relevant publications:*

Wildlife Conservation Society (2006) 'Household Surveys – A Tool for Conservation Design, Action and Monitoring', *Living Landscapes Technical Manual* N°4

Wilkie, D.S., Morelli, G.A., Demmer, J., Starkey, M., Telfer, P., Steil, M. (2006) 'Parks and People: Assessing the Human Welfare Effects of Establishing Protected Areas for Biodiversity Conservation', *Conservation Biology* 20(1): 247-249

## **WCS, IGCP, CARE International - Assessing the Socio-economic Status of People Living Near Protected Areas in the Central Albertine Rift**

The Albertine Rift is an area of global importance for conservation, due to its high biological diversity and, more specifically, to its numerous endemic species of plants and animals. At the same time, this region is one of the most densely populated of Africa, probably because of the highly fertile soils and favourable climate. As a consequence, the protected areas located in this region are threatened by the local population, who often encroach them to collect natural resources to supplement their incomes from farming. Many international and local conservation and development organisations have developed projects, in recent years, aimed at improving the livelihoods of the local populations, to minimise conflicts between local communities and the parks.

In 2002 WCS, IGCP, and CARE International joined forces to carry out a study aimed at providing a baseline assessment of the socio-economic conditions of the people living in the central Albertine Rift, from which future monitoring of conservation and development activities in the region can take place. After a series of meetings, attended by representatives of a large number of stakeholders, it was decided that questionnaire surveys, conducted using a PRA approach, were the best way to collect information on the socio-economic situation of people living in the central Albertine Rift. The questionnaire was built, again in a participatory way, around the following main areas:

- human demography
- household income and agriculture
- attitudes towards conservation
- health education and access to markets

A few comments can be made on the development and implementation of the questionnaire, as a tool for assessing the socio-economic status of local communities:

- Participatory techniques were used throughout the study. This contributed to the achievement of two goals: first, the empowerment of local people; second, the method used to carry out the study (i.e. questionnaire) and the questions asked were agreed upon by local people and recognised by them as being the most useful
- Great care was used in the selection and training of interviewers
- Once collected, data were entered into a computer to facilitate storage and analysis
- 3,907 households were surveyed overall, representing 22,812 people

Key findings of the study on the socio-economic situation of people living around protected areas in the central Albertine Rift:

- the demographic structure is typical of people living below the poverty line
- having poor people living around these protected areas means people are more likely to depend on PAs for their livelihoods, and are less likely to have the time and resources to carry out conservation activities
- development projects implemented so far have had some positive impacts, like: improved access to health and education facilities; improved access to credit schemes; better relationships between local communities and park managers
- the majority of people recognize they benefit from the forests, even though most households feel the country benefits more than they do

In conclusion, the questionnaire has proved to be a good way of assessing the socio-economic status of people living around PAs in the central Albertine Rift. The information thus collected is a useful baseline against which future developments can be monitored, and, possibly, indicators can be developed.

### *Relevant publications:*

Plumptre, A.J., Kayitare, A., Rainer, H., Gray, M., Munanura, I., Barakabuye, N., Asuma, S., Sivha, M., and Namara, A. (2004) *The Socio-economic Status of People Living Near Protected Areas in the Central Albertine Rift*, Albertine Rift Technical Reports N°4

## ODI, DFID, AWF – Applying the Sustainable Livelihoods Approach to Assess the Impacts of Wildlife Enterprises

In 1997 the African Wildlife Foundation (AWF) launched the Wildlife Enterprise and Local Development Project (WELD), which aimed at assessing the effectiveness of wildlife enterprises as a conservation and development tool. In order to achieve this goal, a common methodology for assessing economic and livelihoods impact of wildlife enterprises, based on the sustainable livelihoods (SL) approach, was developed and is here briefly reviewed.

One of the reasons why it was deemed necessary to develop a new methodology, despite the amount of existing work on impact assessment, and why this methodology was based on the SL approach, is that, usually, assessments of conservation projects tend to focus too much on economic aspects rather than including a broader range of livelihoods issues. The innovative aspect of the SL approach, compared to conventional approaches, is that it focuses on people's lives, rather than economic achievements or specific projects outputs, and includes all dimensions of human well-being: economic, social, institutional, and ecological.

The approach adopted by AWF is based on the version of the sustainable livelihoods framework used by DFID. This framework provides an analytical structure, highlighting key components of livelihoods against which project impact can be assessed. The assumption behind this approach is that people pursue a range of livelihood outcomes by drawing on a range of assets, to undertake a range of activities. The activities they adopt depend, in part, on their own preferences and priorities, but also on the context, external policies and institutions.

The SL approach should be interpreted as a framework which helps people think about how to carry out an assessment of the economic and livelihoods impacts of a project, rather than as a defined set of steps to follow.

There are three key components of a livelihood impact assessment that can be identified:

1. Key themes to explore
2. Methods for collecting data
3. Analysis of the results from a livelihood perspective

1. There are three key themes to explore within a livelihood impact assessment:

- current livelihoods strategies, achievements and priorities
- how livelihoods strategies and achievements are influenced by the project
- differences between stakeholders groups

After gaining an adequate understanding of current livelihoods strategies, the next step is to consider project impact on livelihoods. The assessment should consider impacts on all the components of the SL framework:

- assets and capital endowments
- multiple livelihood activities
- outcomes (or components of improved livelihoods)
- people's strategies, priorities and preferences
- context
- external influences (organisations, institutions, policies)
- sustainability
- links between the components dynamic change

In addition to considering impacts on all these components, it is also important to:

- distinguish between short- and long-term impacts
- understand the scale of impacts
- assess empowerment at three different levels: individuals, community organisations, community in relation to outsiders

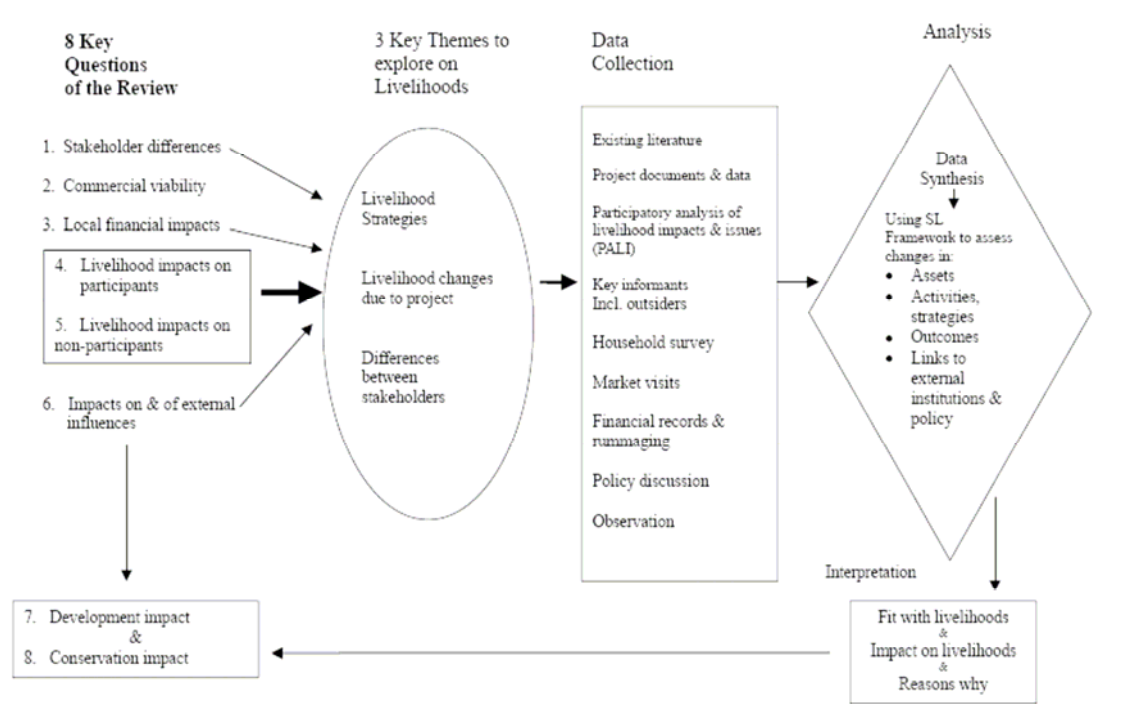
Finally, it is important to identify different stakeholders and to assess the different ways in which they are affected by a project.

2. Many different sources of information can be used to carry out a livelihood impact analysis:

- Existing literature
- Interviews with key individuals

- Group meetings, participatory workshops, participatory assessment of livelihood issues and impact (PALI) (PALI encompasses a range of PRA activities that are useful for exploring livelihoods and project impacts)
  - Household survey
  - Financial records
  - Recall, records, and memories
  - observation
3. The analysis of data gathered using the livelihood assessment methodology should aim to synthesise and structure all the information collected into a form that indicates the overall direction and significance of livelihood change. The analysis of data can be a lengthy and complex phase, but is also key in adding value to the overall livelihood impact analysis.

Figure 2. Summary of the process of livelihood impact analysis used for the WELD project



The SL approach has numerous strengths, such as: it covers a broad range of impacts relevant to people, not just economic aspects; it allows to learn directly from people what are the impacts important to them; it is likely to identify ways in which a project can be improved. However, this approach has also a number of weaknesses: it requires additional resources in terms of time, staff numbers, training, etc.; it is unlikely to provide clear, quantifiable conclusions; the results are rarely comparable.

#### Relevant publications:

Ashley, C., Hussein, K. (2000) *Developing Methodologies for Livelihood Impact Assessment: Experience of the African Wildlife Foundation in East Africa*, ODI, London

Ashley, C. with Elliott, J., Sikoyo, G., and Hanlon, K. (1999) *Handbook for Assessing the Economic and Livelihood Impacts of Wildlife Enterprises*, African Wildlife Foundation and Overseas Development Institute



## CARE International, IUCN, AWF – Assessment of Protected Areas Costs and Benefits

Care International is engaged, together with IUCN and AWF, in an ongoing project aimed at promoting greater social equity in the conservation of PAs. To achieve their goal, the researchers and practitioners involved in this project have developed a methodology to assess the costs at global, national and local levels of a range of different types of PAs. The rationale for this project is that a great deal of anecdotal evidence has been produced regarding the negative impacts that PAs have on the people living in or around them, but no sufficient systematic information has been collected so far on the full range of costs and benefits within local communities, nor are the studies carried out so far representative of a wide range of situations. The overall objective of this project is therefore to address this gap in knowledge and collect a comprehensive set of information which will allow to draw some sound-based conclusions on the actual costs and benefits of PAs.

The methodology developed within this project (the term ‘methodology’ here is used to describe the overall framework for data collection and analysis, and the underlying conceptual framework) is based on the use of two complementary methods:

- *Rapid social impact assessment (RSIA)*: used to identify the costs and benefits of PAs on local communities
- *Economic analysis (EA)*: used to put a dollar value on the most significant costs and benefits of PAs at the local, national and global level.

The analysis aims to take place at four different levels:

- At the *local level* the RSIA (based on the sustainable livelihoods framework) will be used to identify effects of the PA that local people feel generate costs and/or benefits at the community and/or household level, and the significance of these different effects in terms of positive or negative impacts on the well being of their households. As part of the RSIA a scoring exercise will be used to identify the most significant effects, which are believed to cause the greatest impact on household well being. The most significant effects will then become the focus of the economic analysis, which will seek to put a value on the costs or benefits associated with each effect. The EA at the local level will be carried out through a household economic survey (HES) that will focus on costs and benefits that can be valued through market prices. In addition, a participatory environmental valuation (PEV) exercise will be used, in which participants will be asked to assign a relative value to the most significant effects (PEV is basically a PRA scoring exercise, in which people estimate the value of a cost or benefit by assigning scores in relation to known costs/benefits). Finally, the local level assessment will use focus group discussions that have the following objectives: validation, clarification, gender analysis, gaps analysis, and exploring the underlying causes of inequity connected with PAs.
- At the *PA level* a financial analysis is carried out to assess all costs and incomes derived from the PA.
- At the *national level* the assessment aims to estimate the total economic value of the PA to the national economy focusing on direct and indirect values. This assessment will be based, as far as possible, on secondary sources.
- At the *global level* the assessment aims to estimate the total economic value of the PA to people outside the country in which the PA is located. This assessment will be based entirely on secondary sources.

In conclusion, as other participatory approaches, this methodology has the advantage of measuring the costs and benefits of PAs from the point of view of local people. It therefore assesses the effects of PAs as they are really felt at the community and household level. However, since different communities have different ways of defining their well-being, care is needed when comparing the results of the assessments carried out at the local level.

### *Relevant publications:*

CARE International, IUCN, AWF (2006) *Assessment of Protected Area Costs and Benefits. Methodology Guidelines*, Unpublished Draft

## ***Appendix E – Annotated Bibliography***

## ***Annotated Bibliography***

**Agrawal, A. and Redford, K.H. (2006) *Poverty Alleviation and Biodiversity Conservation: Shooting in the Dark?*, Working Paper No 26, WCS, N.Y.**

Poverty alleviation and biodiversity conservation are basic social goals and part of the policy agenda of postcolonial states and international agencies. It is not surprising therefore that a large number of programmatic interventions aim to achieve these two goals simultaneously. This paper examines four such interventions: Community-based wildlife management, extractive reserves, ecotourism, and sustainable livelihoods. The examination focuses especially on the extent to which it may be possible to generate systematic and general conclusions about the outcomes of these interventions.

(available at: <http://www.wcs.org/media/file/wcswp26.pdf>, accessed 24 October 2006)

**Ashley, C. and Hussein, K. (2000) *Developing Methodologies for Livelihood Impact Assessment: Experience of the African Wildlife Foundation in East Africa*, ODI, London**

This Working Paper describes how key concepts of the Sustainable Livelihoods (SL) approach were incorporated into methods for assessing the impact of wildlife projects in East Africa. It explains the rationale for developing an impact assessment methodology incorporating livelihood analysis, summarises the methodology and its application, and identifies several lessons learnt from the application of the SL approach in two case studies in Kenya.

(available at: <http://www.odi.org.uk/publications/wp129.pdf>, accessed 24 October 2006)

**Ashley, C. with Elliott, J., Sikoyo, G. and Hanlon, K. (1999) *Handbook for Assessing the Economic and Livelihood Impacts of Wildlife Enterprises*, African Wildlife Foundation and Overseas Development Institute**

This handbook describes a methodology developed within AWF's WELD project to assess the economic and livelihood impacts of a wildlife enterprises. More specifically, this handbook, which is aimed at conservation and development practitioners, provides a detailed step-by-step guide of how to implement this methodology.

(available at: <http://www.odi.org.uk/rpeg/finalmethodology.pdf>, accessed 20 December 2006)

**Bigman, D. and Fofack, H. (2000), 'Geographical Targeting for Poverty Alleviation: An Introduction to the Special Issue', *The World Bank Economic Review*, 14(1): 129-145**

Based on the hypothesis that efficiency in the allocation of resources for poverty reduction can be increased by targeting increasingly smaller areas, this article proposes several techniques for increasing data to produce more detailed poverty maps. In addition, it assesses the advantages and disadvantages of geographical targeting and describes how geographic information systems can be applied to improve poverty mapping.

(available at: [http://www.worldbank.org/research/journals/wber/revjan00/pdf/Article\\_7.pdf](http://www.worldbank.org/research/journals/wber/revjan00/pdf/Article_7.pdf), accessed 25 October 2006)

**BirdLife International (2006) *Monitoring the Socio-Economic Impacts of Projects at IBAs: A Global Framework*, version 0. Unpublished draft**

This document discusses BirdLife's approach to monitoring the contribution of its projects to human well-being. The monitoring framework developed by BirdLife is presented, together with information on how to implement it at project's sites.

**Brockington, D. and Igoe, J. (2006) 'Eviction for Conservation: A Global Overview', *Conservation and Society*, 4(3): 424–470**

This paper examines one aspect of displacement: eviction from protected areas. The authors examine divergent opinions about the quality of information available in the literature. They show that there has been a remarkable surge of publications about relocation after 1990, yet most protected areas reported in these publications were established before 1980. This reflects two processes, first a move within research circles to recover and rediscover protected areas' past, and second stronger enforcement of existing legislation. Finally, the authors review the better analyses of the consequences of relocation from protected areas which are available and highlight areas of future research.

(available at: [http://www.conservationandsociety.org/cs\\_4\\_3\\_7-424.pdf](http://www.conservationandsociety.org/cs_4_3_7-424.pdf), accessed 16 January 2007)

**CARE International, IUCN, AWF (2006) *Assessment of Protected Area Costs and Benefits. Methodology Guidelines*, Unpublished Draft**

**Cernea, M.M. (2005) 'Restriction of Access' is Displacement: A Broader Concept and Policy', *FMR*, 23: 48-49**

This article briefly discusses the dramatic implications that recent changes in the World Bank's policy on resettlement have for those displaced by conservation projects, for governments, NGOs and researchers.

(available at: <http://www.fmreview.org/FMRpdfs/FMR23/FMR2320.pdf>, accessed 16 January 2007)

**Cernea, M.M. and Schmidt-Soltan, K. (2006) 'Poverty Risks and National Parks: Policy Issues in Conservation and Resettlement', *World Development*, 34(10): 1808-1830**

The authors report empirical evidence from 12 case studies from six countries, which are analysed through the conceptual lens of the Impoverishment Risks and Reconstruction Model for Involuntary Resettlement, in order to improve our understanding of the conflict between poverty reduction and biodiversity conservation. The research concludes conservatively that parks in the Congo basin have already displaced and impoverished about 120–150,000 people and that more will be displaced if this approach continues. The alternative course, proposed by the authors, is to replace forced displacements with a pro-poor strategy that pursues 'double sustainability', to protect both the biodiversity and people's livelihoods at the same time.

**Chape, S., Blyth, S., Fish, L., Fox, P. and Spalding, M. (compilers) (2003) *2003 United Nations List of Protected Areas*, IUCN, Gland and Cambridge and UNEP-WCMC, Cambridge**

The 2003 United Nations List of Protected Areas presents data on 102,102 protected areas covering 18.8 million km<sup>2</sup>.

(available at: <http://www.unep.org/PDF/Un-list-protected-areas.pdf>, accessed 15 December 2006)

**Christiansen, G. and Conner, N. (1999) *The Contribution of Montague Island Nature Reserve to Regional Economic Development*, New South Wales National Parks and Wildlife Service, Hurstville, NSW, Australia**

This report describes the results of an economic impact assessment carried out by the NPWS to identify the contribution of the Montague Island Nature Reserve to the regional economy of the Eurobodalla Local Government Area (LGA), in which the Island is situated. This contribution arises from NPWS expenditure on managing and protecting the natural and cultural heritage values of the Nature Reserve, and the expenditure on goods and services made by visitors to the Island, which accrues to the local economy.

(available at:

[http://www.nationalparks.nsw.gov.au/PDFs/Montague\\_Island\\_regional\\_economic\\_development.pdf](http://www.nationalparks.nsw.gov.au/PDFs/Montague_Island_regional_economic_development.pdf), accessed 15 December 2006)

**CIESIN (Center for International Earth Science Information Network) (2006) *Where the Poor Are: An Atlas of Poverty*, Columbia University, N.Y.**

This atlas is a product of the CIESIN Global Poverty Mapping Project. The atlas, brings together a diverse collection of maps from different continents and countries, depicting small area estimates of vital development indicators at unprecedented levels of spatial detail. These poverty maps provide practical examples of how the data and tools have been used, and may be used, in applied decisions and poverty interventions, and also reveal possible causal patterns of the distribution of poverty.

(available at: <http://www.ciesin.columbia.edu/povmap/downloads/maps/atlas/atlas.pdf>, accessed 25 October 2006)

**Davis, B. (2003) *Choosing a Method for Poverty Mapping*, FAO, Rome**

The choice of a poverty-mapping methodology depends on a number of logical and legitimate considerations, such as the objectives of the poverty mapping exercise, philosophical views on poverty, limits on data and analytical capacity, and cost. This paper from FAO presents and compares a large selection of poverty and food-security mapping methodologies in use.

(available at:

<http://www.povertymap.net/publications/doc/CMPM%20DAVIS%2013%20apr03%20sec.pdf>, accessed 24 October 2006)

**de Sherbinin, A. (2006) *Protected Areas and Poverty: Selected Descriptive Statistics*, unpublished document, CIESIN**

This paper combines a global map of infant mortality rates, with parks included in the 2006 World Database of Protected Areas (WDPA) to provide some simple descriptive statistics on poverty levels by protected area category, size, and establishment date.

**Deichmann, U. (1999) *Geographic Aspects of Inequality and Poverty*, World Bank, Washington D.C.**

In this paper the author briefly discusses why geographic aspects of inequality and poverty have become an important component of poverty research and policy analysis, how poverty maps are constructed, what their limitations are, and how they can be used in research and policy making.

(available at: [http://povlibrary.worldbank.org/files/5319\\_povmap.pdf](http://povlibrary.worldbank.org/files/5319_povmap.pdf), accessed 25 October 2006)

**DFID, Rural Livelihoods Department, Livestock, Wildlife Advisory Group (2002) *Wildlife and Poverty Study*, DFID Rural Livelihoods Department, London**

This paper, prepared by Joanna Elliott, a member of DFID's Livestock and Wildlife Advisory Group, is based on six case studies and on an extensive literature review of wildlife-poverty linkages. The study focuses on pro poor tourism, bushmeat, community based wildlife management and pro poor conservation.

(available at: <http://www.iwmc.org/IWMC-Forum/Articles/WildlifePovertyStudy.pdf>, accessed 24 October 2006)

**Dowie, M. (2005) 'Conservation Refugees: When Protecting Nature Means Kicking People Out', *Orion Magazine*, Nov/Dec 2005**

The author of this provocative article discusses the impacts of PAs on the people living in and around them, and the role played in this process by conservation organisations.

(available at: <http://www.oriononline.org/pages/om/05-6om/Dowie.html>, accessed 15 January 2007)

**Esty, D.C., Levy, M.A., Srebotnjak, T. and de Sherbinin, A. (2005) *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*, Yale Center for Environmental Law & Policy, New Haven**

This report describes the Environmental Sustainability Index (ESI), an index that benchmarks the ability of nations to protect the environment over the next several decades.

(available at: [http://www.yale.edu/esi/ESI2005\\_Main\\_Report.pdf](http://www.yale.edu/esi/ESI2005_Main_Report.pdf), accessed 15 January 2007)

**Esty, D.C., Levy, M.A., Srebotnjak, T., de Sherbinin, A., Kim, C.H. and Anderson, B. (2006) *Pilot 2006 Environmental Performance Index*, Yale Center for Environmental Law & Policy, New Haven**

This report describes the Environmental Performance Index (EPI), which centers on two broad environmental protection objectives: 1) reducing environmental stresses on human health, and 2) promoting ecosystem vitality and sound natural resource management.

(available at: [http://www.yale.edu/epi/2006EPI\\_Report\\_Full.pdf](http://www.yale.edu/epi/2006EPI_Report_Full.pdf), accessed 15 January 2007)

**Fanshawe, J. and Thomas, D. (2005) *Developing an Approach for Monitoring the Contribution of BirdLife's Local Work to Human Well-Being and Poverty Reduction*, BirdLife International (unpublished discussion paper)**

In this paper the authors discuss BirdLife's effort to develop a framework for monitoring poverty-reduction impacts at site-based projects. In particular, they highlight the considerations and assumptions at the base of this approach, and the main components of the framework.

**Fanshawe, J. and Thomas, D. (2005), *Basic Framework for Monitoring Poverty Reduction Impact at IBAs and Projects*, BirdLife International (unpublished discussion paper)**

In this document, the authors take the discussion about BidLife's framework for monitoring poverty-reduction impacts at site-based project a step further, by proposing a standardised framework and discussing its main characteristics.

**Gallopín, G. (1997) Indicators and Their Use: Information for Decision-Making, in Moldan, B. and Billharz, S. (eds) *Sustainability Indicators. Report on the Project on Indicators of Sustainable Development*, John Wiley, Chichester, UK**

This chapter describes indicators, their characteristics and their use.

(available at: <http://www.icsu-scope.org/downloadpubs/scope58/ch01-introd.html>; accessed 16 January 2007)

**Garaway, C. and Esteban, N. (2002) *The Impact of Marine Protected Areas on Poorer Communities Living In and Around Them: Institutional Opportunities and Constraints: Appendix 1 – Methodology for Case Study Fieldwork*, December 2002**

This paper briefly described the general approach and specific methodology adopted by this DFID's study aimed at assessing the impact of marine protected areas on poorer communities living in and around them.

(available at: <http://www.mrag.co.uk/Documents/r7976/R7976Appendix1.pdf>, accessed 20 December 2006)

**Henninger, N., (1998) *Mapping and Geographic Analysis of Human Welfare and Poverty: Review and Assessment*, WRI, Washington D.C.**

This report, which is part of an ongoing collaborative project between UNEP and CGIAR to strengthen the use of Geographic Information Systems (GIS) in agricultural research, provides a comprehensive overview of activities in the area of spatial analysis of human welfare and poverty.

(available at: [http://www.povertymap.net/publications/doc/pov\\_fin.pdf](http://www.povertymap.net/publications/doc/pov_fin.pdf), accessed 24 October 2006)

**Henninger, N. and Hammond, A. (2002) *Environmental Indicators Relevant to Poverty Reduction*, Environment Strategy Papers No 3, World Bank, Washington D.C.**

This background paper focuses on natural resource indicators and a spatial analysis that can be used to target and monitor poverty reduction outcomes. The work draws largely on the Geographic Information System-based 'potential risk indicators' developed by the World Resources Institute (WRI) for major types of ecosystems worldwide and for which reasonably good data are available (such as agro-ecosystems, forest, grasslands, and coastal systems).

(available at: [http://lnweb18.worldbank.org/ESSD/envext.nsf/41ByDocName/EnvironmentStrategyPaperNo3EnvironmentalIndicatorsRelevanttoPovertyReduction200246MBPDF/\\$FILE/ESP3Part1Indicators2002.pdf](http://lnweb18.worldbank.org/ESSD/envext.nsf/41ByDocName/EnvironmentStrategyPaperNo3EnvironmentalIndicatorsRelevanttoPovertyReduction200246MBPDF/$FILE/ESP3Part1Indicators2002.pdf), accessed 24 October 2006)

**Henninger, N. and Snel, M. (2002) *Where are the Poor? Experiences with the Development and Use of Poverty Maps*, WRI, Washington D.C.**

In this report the authors examine poverty mapping. They show how poverty maps can be used by international, national, and local decision-makers to direct investments in human development and they demonstrate the importance of the *spatial* dimensions of

poverty. Furthermore, drawing on case studies from 14 countries in Africa, Asia, and Latin America, the authors review how poverty maps were used and some of the factors constraining their use in a wide variety of geographic and institutional settings.

(available at: <http://pdf.wri.org/wherepoor.pdf>, accessed 24 October 2006)

**ICEM (2003) *Field Studies: Economic Benefits of Protected Areas, Lower Mekong Protected Areas and Development Review*, ICEM, Indooroopilly, Queensland, Australia**

This Review (PAD Review) examines the growing tensions between economic and conservation objectives in the four countries of the lower Mekong River region: Cambodia, Lao PDR, Thailand and Vietnam. It identifies the many development benefits flowing from protected areas and the need to reflect them in the plans and budgets of forestry, agriculture, energy, tourism, fisheries and other key economic sectors.

(available at: <http://www.mekong-protected-areas.org/mekong/docs/field-intro.pdf>, accessed 15 November 2006)

**Igoe, J. (2006) 'Measuring the Costs and Benefits of Conservation to Local Communities', *Journal of Ecological Anthropology*, 10: 72-77**

**IUCN (2006) *Earth's Special Places. Investing in IUCN's Work on Protected Areas*, IUCN, Gland**

In this publication, IUCN briefly outlines the current situation, challenges and future plans for the conservation of protected areas.

**Kapos, V., Aveling, R., Bubbs, P., Carey, P., Entwistle, A., Hopkins, J., Mulliken, T., Safford, R., Stattersfield, A., Walpole, M. and Balmford, A. (2006) *Building Consensus about Measuring Conservation Success: Preliminary Results from a 20-Organisation Project*, 1st European Congress for Conservation Biology, Eger, Hungary**

This paper discusses the outcomes of a project carried out by the Cambridge Conservation Forum (CCF) called 'Harmonising Measures of Conservation Success', aimed at developing harmonised approaches for assessing the success and impacts of conservation actions, and, ultimately, aimed at identifying successful approaches and the factors that contribute to their success.

**Katariya, V., de Sherbinin, A., Oviedo, G. and Wagner, M. (eds) (2005) *Poverty-Conservation Mapping: The Geography of Poverty and Biodiversity*, UNEP, GRID Arendal, ADB, Cooperazione Italiana, IUCN**

This publication aims to communicate and illustrate the poverty-environment mapping efforts of several international organizations in order to enhance and improve knowledge of the methodologies and indicators that have been developed and implemented worldwide. More specifically, the initiatives described in this booklet are the work of the institutions that presented at the 3<sup>rd</sup> IUCN World Conservation Congress held in Bangkok in November 2004, at a workshop entitled *Mapping Poverty & Conservation Linkages: Using Decision-Support-System Tools to Help Implement the MDGs*.

(available at: <http://www.iucn.org/themes/spg/Files/IUCNmapping.pdf>, accessed 24 October 2006)

**Kazoora, C. (2002) *Poverty Alleviation and Conservation: Linking Sustainable Livelihoods and Ecosystem Management. A Case Study of Uganda*, IUCN EARO, Nairobi**



Worldwide, livelihood issues and poverty reduction have emerged, as major concerns in government and donor programmes. In this context, IUCN has launched a new global project to develop a strategy and approach that will enable it to convincingly understand and demonstrate the links between poverty reduction, sustainable livelihoods and ecosystem management. This report on Uganda has been made as part of that project, which also includes case studies in Tanzania, Lao PDR and Vietnam. The findings of the study, illustrated in this report, allow IUCN to advocate for a better integration of ecosystem management and sustainable livelihoods in their programs.

(available at: [http://www.iucn.org/themes/fcp/publications/files/uganda\\_poverty.pdf](http://www.iucn.org/themes/fcp/publications/files/uganda_poverty.pdf), last accessed 24 October 2006)

**Locally-Managed Marine Protected Area Network (2003) *Learning Framework for the Locally-Managed Marine Area Network*, LMMA Network, Suva**

This document provides a guide for monitoring locally-managed marine protected areas.

(available at: <http://www.lmmanetwork.org/pdfs/LearningFramework.pdf>, accessed 20 December 2006)

**Moiseev, A., Dudley, E. and Cantin, D. (2002) *The Wellbeing of Forests: An E-Tool for Assessing Environmental and Social Sustainability*, IUCN, Gland and Cambridge**

This paper presents a set of 26 indicators of human and ecosystem well-being, organized according to IUCN's Sustainability Assessment method, based on forest themes and concerns. The paper is intended to accompany Sustainability Assessment software, called "Wellbeing Scores". The software allows users to manipulate and combine these measures and generate maps to test their assumptions and judgments on sustainability. This paper attempts to bring together some key issues and concerns on forest conservation, along with data and some analysis to provide a context for using the software.

(available at: <http://www.iucn.org/places/canada/pdf/WellBeing%20PartA.pdf>, accessed 24 October 2006)

**Nunan, F. with Grant, U., Bahiigwa, G., Muramira, T., Bajracharya, P., Pritchard, D., and Jose Vargas, M. (2002) *Poverty and the Environment: Measuring the Links. A Study of Poverty-Environment Indicators with Case Studies from Nepal, Nicaragua and Uganda*, Environment Policy Department, Issue Paper No. 2, DFID, London**

Human development and environmental issues have generally been looked at separately, and there is a need to develop indicators that reflect the relationships between them, particularly focusing on poverty and environment. This has been highlighted in the recent initiative of the World Bank/International Monetary Fund to promote the development of Poverty Reduction Strategy Papers (PRSPs) setting out the poverty profile of a country and key initiatives that will contribute towards poverty reduction. Many of the country PRSPs produced to date have not sufficiently considered environmental issues or recognised the linkages between poverty and the environment. Subsequently, associated poverty-environment indicators have not been generated.

(available at: <http://www.dfid.gov.uk/pubs/files/povertyandtheenvironment.pdf>, accessed 24 October 2006)

**OECD (2001) *The DAC Guidelines: Poverty Reduction*, Organisation for Economic Cooperation and Development, France**

Under the impetus of the OECD/DAC strategy 'Shaping the 21st Century' bilateral agencies have developed this set of guidelines to help them work more effectively to reduce poverty.

(available at: <http://www.oecd.org/dataoecd/47/14/2672735.pdf>, accessed 16 January 2007)

**Pennushi, G., Rubio, G. and Subbarao, K. (2001) 'Monitoring and Evaluation', in *Poverty Reduction Strategy Papers Source Book*, World Bank, Washington, D.C.**

**Plumptre, A.J., Kayitare, A., Rainer, H., Gray, M., Munanura, I., Barakabuye, N., Asuma, S., Sivha, M. and Namara, A. (2004) *The Socio-economic Status of People Living Near Protected Areas in the Central Albertine Rift*, Albertine Rift Technical Reports N°4**

This report summarises the results of a baseline survey of people living within 10 km of six protected areas in the central Albertine Rift region of Africa. Many projects are carried out in the region with the aim of alleviating poverty, and yet the progress of these projects towards achieving their goal are rarely assessed. The aim of this report is to provide a baseline assessment of the socio-economic conditions of the people living in the area, from which future monitoring can take place.

(available at [http://albertinerift.org/media/file/Socioeconomic\\_status\\_in\\_Central\\_AR.pdf](http://albertinerift.org/media/file/Socioeconomic_status_in_Central_AR.pdf), accessed 20 December 2006)

**Poverty Environment Partnership (2005) *Assessing Environment's Contribution to Poverty Reduction*, UNDP, N.Y.**

In this publication the Poverty Environment Partnership (PEP) explores the range of indicators and assessment methodologies available on the linkages between poverty reduction and natural resource management. In particular, it looks at developing countries and how to help them choose the most appropriate assessment tools given their limited resource availability.

(available at: [http://www.undp.org/pei/pdfs/Indicators\\_Paper\\_Final.pdf](http://www.undp.org/pei/pdfs/Indicators_Paper_Final.pdf), accessed 18 December 2006)

**Reed, D. and Tharakan, P. (2004) *Developing and Applying Poverty Environment Indicators*, WWF, Washington D.C.**

This document focuses on the design and implementation of a poverty-environment information system and the indicators that flow from that system.

(available at: [http://www.undp.org/pei/pdfs/WWF\\_Poverty-Environment\\_Indicators.pdf](http://www.undp.org/pei/pdfs/WWF_Poverty-Environment_Indicators.pdf), accessed 24 October 2006)

**Roche, C. (1999) *Impact Assessment for Development Agencies: Learning to Value Change*, Oxfam, Oxford**

Considering the process of impact assessment, this book shows how and why it needs to be integrated into all stages of development programmes - from planning to evaluation.

**Sanderson, S.E. and Redford, K.H. (2003) 'Contested Relationships Between Biodiversity Conservation and Poverty Alleviation', *Oryx* 37 (4): 389-390**

In recent years, major international donors have decided to develop significant new programmes in poverty alleviation, often in place of previous biodiversity, or

environmental, programmes. The logic used by such groups is that in many cases poverty alleviation will result in biodiversity conservation. In this paper the authors detail the logic underlying these different perspectives, and they demonstrate the gaps in current thinking governing expectations that investments in poverty alleviation will result in biodiversity conservation. Finally, the authors conclude that both poverty alleviation and biodiversity conservation are worthy societal goals, but that linking them causally may result in losses for both poor people and biodiversity.

**Sanderson, S., Redford, K. (2004) 'The Defence of Conservation Is Not an Attack on the Poor', *Oryx* 38 (2): 146-147**

This article represents a further step in the discussion on the relationships between poverty alleviation and biodiversity conservation.

**Sayer, J., Campbell, B., Maginnis, S. and Sengupta, S. (2006) *How to Assess the Outcomes of Conservation and Development Interventions in Landscape Mosaic* (working draft), IUCN, WWF, CIFOR**

In this working paper the authors present a conceptual framework to assess the outcomes of conservation and development projects, discuss how to implement it and its main advantages and disadvantages.

**Sayer, J., Campbell, B., Petheram, L., Aldrich, M., Ruiz Perez, M., Endamana, D., Nzooh Dongmo, Z., Defo, L., Mariki, S., Doggart, N. and Burgess, N. (2006) 'Assessing Environment and Development Outcomes in Conservation Landscapes', *Biodiversity Conservation***

This article describes an approach to assessing the environmental outcomes and changes in peoples' livelihoods resulting from landscape-scale conservation interventions that was developed for three locations in Africa. This framework, combined with the use of social learning techniques, helped stakeholders develop greater understandings of landscape system dynamics and the of linkages between livelihood and conservation objectives.

**Scherl, L.M., Wilson A., Wild, R., Blockhus, J., Franks, P., McNeely, J.A. and McShane, T.O. (2004) *Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations*, IUCN, Gland**

This book presents an overview of how protected areas relate to poverty, both positively and negatively. On the one hand, it is undeniable that protected areas deliver many benefits to the people living in and around them, ranging from tourism to ecosystem services. On the other hand, protected areas may prevent some forms of resource use, and harbour animals that may damage crops in adjacent lands. This book, built on a broad consensus of leading organisations working in the conservation and development fields, advocates that by carefully addressing the potential conflicts between people and protected areas in an open and inclusive manner, protected area authorities can forge a productive partnership with the rural poor.

(available at: <http://app.iucn.org/dbtw-wpd/edocs/2004-047.pdf>, accessed 24 October 2006)

**Schmidt-Soltan, K. (2003) 'Conservation-related Resettlement in Central Africa: Environmental and Social Risks', *Development and Change*, 34(3): 525-551**

This article focuses on the issue of resettlement within the context of central Africa. In particular, it reviews the only 'official' relocation programmes carried out in the Congo River Basin, and evaluates different approaches adopted by National Parks in

Equatorial Guinea, Cameroon, Central African Republic, Congo (Brazzaville), and Gabon. The author uses the Impoverishments Risk and Reconstruction model introduced by Cernea to evaluate the risks faced by the resettled populations, and to elaborate some social and environmental guidelines to mitigate them.

**Shyamsundar, P. (2002) *Poverty-Environment Indicators*, Environmental Economics Series, Paper No. 84, World Bank, Washington D.C.**

This paper seeks to identify different ways in which indicators can be used to understand poverty-environment interactions and to monitor poverty reduction that results from environmental changes.

(available at:

[http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/PovertyandEnvironmentIndicators2002189KPDF/\\$FILE/PovertyandEnvironmentIndicators2002.pdf](http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/PovertyandEnvironmentIndicators2002189KPDF/$FILE/PovertyandEnvironmentIndicators2002.pdf), accessed 24 October 2006)

**Snel, M. (2004) *Poverty-Biodiversity Mapping Applications*, paper delivered at the IUCN World Conservation Congress, 17-25 November 2004**

This is a discussion paper prepared by the author for UNEP/GRID-Arendal for the session 'Decision-support systems - Their value in addressing health-poverty-conservation links' at the IUCN World Conservation Congress, November 17-25 2004, Bangkok, Thailand. The paper discusses possible applications of poverty mapping for IUCN and its members, and also features a new set of maps overlaying and integrating poverty and biodiversity on various spatial scales.

(available at: [http://www.povertymap.net/publications/doc/iucn\\_2004/poverty-biodiversity.pdf](http://www.povertymap.net/publications/doc/iucn_2004/poverty-biodiversity.pdf), accessed 24 October 2006)

**UNDP (2004) *Human Development Report 2004: Identity, Diversity and Globalization*, Oxford University Press, New York and Oxford**

The Human Development Report 2004 exposes myths that regard diversity as a threat to nations and states, and an obstacle to development. It asserts that struggles over economic resources and political power, not diversity, are most often at the root of conflict.

**UNEP/GRID - Arendal (1997) *Mapping Indicators of Poverty in West Africa***

This report discusses a pilot study carried out to examine the relationship between the location of rural poor population and land use potential in West Africa using Geographic Information Systems technology.

(available at: <http://www.povertymap.net/publications/doc/westafrica/index.htm>; accessed 24 October 2006)

**Walpole, M. (2006) *Partnerships for Conservation and Poverty Reduction*, *Oryx* 40(3): 245-246, Cambridge University Press, Cambridge**

In this guest editorial the author briefly discusses the linkages between conservation and poverty alleviation, and, in particular, the role that conservation organisations can play in supporting efforts aimed at decreasing poverty.

**Walpole, M. and Wilder, L. (2006) *The Case for Integrating Conservation and Human Needs*, *Fauna & Flora*, No 9, October 2006**

This leaflet describes the approach of Fauna & Flora International, a conservation organisation, towards the linkages between poverty and biodiversity conservation, and FFI's specific programme of work on improved livelihoods.

**West, P., Igoe, J. and Brockington, D. (2006) 'Parks and Peoples: The Social Impact of Protected Areas', *Annual Review of Anthropology*, 35: 251-277**

This review examines the social, economic, and political effects of environmental conservation projects as they are manifested in protected areas. The authors pay special attention to people living in and displaced from protected areas, analyze the worldwide growth of protected areas over the past 20 years, and offer suggestions for future research trajectories in anthropology.

**Wildlife Conservation Society (2006) 'Household Surveys – A Tool for Conservation Design, Action and Monitoring', *Living Landscapes Technical Manual* N°4**

The authors of this paper describe how household surveys can be used to assess the impact of protected areas on people. In particular, the authors describe which data should be collected, how should the data be collected and provide practical suggestions on how to address technical problems that researchers might encounter in their assessment work.

**Wilkie, D.S., Morelli, G.A., Demmer, J., Starkey, M., Telfer, P. and Steil, M. (2006) 'Parks and People: Assessing the Human Welfare Effects of Establishing Protected Areas for Biodiversity Conservation', *Conservation Biology* 20(1): 247-249**

In this paper Wilkie *et al* address the issue of how to assess the effect on people of establishing protected areas. They first of all discuss why it is important to carry out these kind of assessments and what are the main challenges connected with this type of evaluation. Then, they briefly describe the assessment method they developed to evaluate the human impact of PAs.

**WWF (2004) *Are Protected Areas Working? An Analysis of Forest Protected Areas*, WWF International, Gland**

In this report WWF discusses the key findings of a survey of management effectiveness carried out in over 200 forest protected areas in 37 countries, using a tracking tool developed in collaboration with the World Bank and the World Commission on Protected Areas. This is the global survey with the widest sampling of countries yet undertaken of protected area effectiveness using a consistent methodology.

(available at: <http://assets.panda.org/downloads/areprotectedareasworking.pdf>, accessed 24 October 2006)

## ***Appendix F – Relevant Websites***

## ***Relevant Websites***

### **Ecosystem Services**

- WRI - Pilot Analysis of Global Ecosystems (PAGE):  
[http://projects.wri.org/project\\_text.cfm?ProjectID=88](http://projects.wri.org/project_text.cfm?ProjectID=88)
- WRI – Poverty and Ecosystem Services in East Africa  
[http://www.wri.org/biodiv/project\\_description2.cfm?pid=171](http://www.wri.org/biodiv/project_description2.cfm?pid=171)

### **Indicators**

- 2010 Biodiversity Indicators Partnership:  
<http://www.twentyten.net/>
- 2010 Biodiversity Target  
<http://www.biodiv.org/2010-target/default.aspx>
- Eurostat – Sustainable Development Indicators:  
[http://epp.eurostat.ec.europa.eu/portal/page?\\_pageid=1998,47433161,1998\\_47437052&\\_dad=portal&\\_schema=PORTAL#THEME2](http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1998,47433161,1998_47437052&_dad=portal&_schema=PORTAL#THEME2)
- UNDP – Composite Indices:  
<http://hdr.undp.org/statistics/indices/>
- IAIA:  
<http://www.iaia.org/>
- IISD - Compendium of Sustainable Development Indicator Initiatives:  
<http://www.iisd.org/measure/compendium/>
- IISD - Science and Policy Dialogue on Designing Effective Indicators of Sustainable Development:  
<http://www.iisd.org/measure/scipol/>
- ISIN:  
<http://www.sustainabilityindicators.org/>
- TEMS (Terrestrial Ecosystem Monitoring Sites):  
<http://www.fao.org/gtos/tems/>
- United Nations Statistics Division – Millennium Development Goals Indicators:  
<http://unstats.un.org/unsd/mdg/>
- UNDESA – Indicators of Sustainable Development:  
<http://www.un.org/esa/sustdev/natlinfo/indicators/isd.htm>

### **Information Sources**

- Center for International Earth Science Information Network (CIESIN)  
<http://www.ciesin.columbia.edu/>
- Eldis Poverty Resource Guide:  
<http://www.eldis.org/poverty/>
- IMF - Poverty Reduction Strategy Papers (PRSP):  
<http://www.imf.org/external/np/prsp/prsp.asp>

- USAID – Demographic and Health Survey (DHS):  
<http://www.measuredhs.com/>
- World Bank - Living Standards Measurement Study (LSMS):  
<http://www.worldbank.org/html/prdph/lms/>

## Initiatives

- Biodiversity Conservation Network:  
<http://www.bcnet.org>
- CCF – Harmonising Measures of Conservation Success:  
[http://www.cambridgeconservationforum.org/measures\\_of\\_success.htm](http://www.cambridgeconservationforum.org/measures_of_success.htm)
- Conservation Measures Partnership (CMP):  
<http://www.conservationmeasures.org/CMP/>
- NOAA - Global Socio-economic Monitoring Initiative for Coastal Management (SocMon):  
<http://international.nos.noaa.gov/socioeconomic/>
- The Project on Human Development:  
<http://humandevlopment.bu.edu/index.cfm>
- United Nations System-Wide Earth Watch – Poverty:  
<http://earthwatch.unep.net/poverty/>

## Poverty

- Chronic Poverty Research Centre (CPRC)  
<http://www.chronicpoverty.org/>
- Development Gateway – Poverty:  
<http://topics.developmentgateway.org/poverty>
- UNDP – International Poverty Centre:  
<http://www.undp-povertycentre.org/povdist.htm>
- UN Division on Social Policy and Development - Poverty Eradication  
<http://www.un.org/esa/socdev/poverty/poverty.htm>
- World Bank – Poverty in Africa  
<http://www4.worldbank.org/afr/poverty/default.cfm>
- World Bank - PovertyNet  
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/0,,menuPK:336998~pagePK:149018~piPK:149093~theSitePK:336992,00.html>

## Poverty and Environment

- Population-Environment Research Network (PERN):  
<http://www.populationenvironmentresearch.org/>
- Poverty Environment Net:  
<http://www.povertyenvironment.net/>
- Poverty Environment Partnership:



<http://www.povertyenvironment.net/pep/>

## Poverty Mapping

- CIESIN (Center for International Earth Science Information Network) - Poverty Mapping Project:  
<http://www.ciesin.columbia.edu/povmap/>
- FAO, UNEP and CGIAR – Poverty Mapping:  
<http://www.poverty-map.net/>
- FIVIMS (Food Insecurity and Vulnerability Information and Mapping Systems):  
<http://www.fivims.org/>
- IUCN – Conservation for Poverty Reduction Initiative/Poverty Mapping:  
[http://www.iucn.org/themes/spg/portal/tools/poverty\\_mapping/index.htm](http://www.iucn.org/themes/spg/portal/tools/poverty_mapping/index.htm)
- UNEP WCMC - Forest and Poverty Mapping in South Asia:  
<http://www.unep-wcmc.org/forest/poverty>
- World Bank – Poverty Mapping:  
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/0,,contentMDK:20219777~menuPK:336998~pagePK:148956~piPK:216618~theSitePK:336992,00.html>
- WRI - Global Poverty Map and Databases of Human Wellbeing and Poverty  
[http://www.wri.org/biodiv/project\\_description2.cfm?pid=75](http://www.wri.org/biodiv/project_description2.cfm?pid=75)