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Valuation of Peri-Urban Natural Resource Productivity

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EXECUTIVE SUMMARY

The project developed and tested a decision framework for assessing natural resource values in two case study city-regions: Kumasi, Ghana, and Hubli-Dharwad, India. The framework aims to enable decision-makers to identify resource users and compare the economic values of different uses of peri-urban natural resources. It draws on a range of methods and techniques used to inform natural resource management, including methods for estimating non-market benefits as well as other land use appraisal and planning tools.

Preliminary testing was carried out through the use of semi-structured interviews with target institutions, surveys of users of the natural resource and gathering information on values such as land prices. The preliminary testing concluded that the following elements are of practical use within the framework:

- Guidelines on which valuation methods are most suitable in which situations. Methods such as those used in environmental impact assessment (EIA) could be drawn on to generate baseline data, for example.
- Stakeholder analysis is essential to identify the different uses and users of natural resources.

The decision framework is presented in the main output of the research, a booklet. This sets out how valuing natural resources can aid decision-making, which valuation methods can be used for different types of values and guidelines on how to apply the methods. Stakeholder analysis should ensure that all users of a natural resource are identified and their values sought. This should contribute to providing an avenue for consultation among all affected groups, including low-income communities.

Whilst the framework can be used to feed into established planning and decision-making approaches within a peri-urban context, there are a number of issues which should be considered:

- Within the case study city-regions, many agencies with responsibilities for natural resource management do not effectively involve all affected stakeholders in planning and decision-making processes. As the framework requires that all stakeholders and their values for natural resources are taken into account, this may present new challenges, as well as opportunities, for such organisations.
- Following on from this, there is, therefore, a need to widely disseminate the findings from the research, which will be available in a booklet, to contribute to greater understanding of the benefits arising from involving stakeholders in decision-making. The booklet will also encourage recognition of competing demands placed on natural resources and explain how these demands can be expressed and compared using monetary valuation.
- Training in participatory planning techniques, as well as valuation methods, would contribute to the process of improving natural resource management and decision-making within the peri-urban interface.
- A "rough and ready" approach to the valuation of natural resources within the peri-urban interface may generate sufficient information to inform decision-making, rather than using detailed and sophisticated analytical techniques.

The framework requires further testing and refinement, but should enable decision-makers to see how different uses of natural resources affect the livelihoods of different stakeholders.

Further work could be conducted on how sustainability issues can be taken into account by decision-makers and how organisations can work together to make the best use out of the framework.

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CONTENTS

Executive Summary		ii
Acknowledgements		iv
List of boxes		vii
List of figures		vii
List of tables		vii
Abbreviations		vii
Research team		viii

1. Background and Project Purpose

1.1	Introduction	1
1.2	Project Purpose	1
1.3	Demand for the research	2
1.4	Previous research	3

2. Research Activities

2.1	Introduction	5
2.2	Literature reviews	5
2.3	Selection of case studies	6
2.4	Testing the valuation approach	6
	2.4.1 Hubli-Dharwad	7
	2.4.2 Kumasi	8
2.5	Draft production of the booklet	9

3. Outputs

3.1	Introduction	10
3.2	Review of literature	10
3.3	Decision framework	10
3.4	Dissemination of the framework, with guidelines, through a booklet	13
3.5	Identification of further research directions	13

4. Contribution of Outputs

4.1	Contribution towards DFID's developmental goals	14
4.2	Promotion pathways	14
4.3	Further development of the approach	15
4.4	Publications	16

References 17

Appendices

A. Terms of reference 18
B. Logical Framework 19
C. Methodological guidelines for Hubli-Dharwad 21
D. Key informants in Bangalore and Hubli-Dharwad 29
E. Notes from Kumasi visit 31
F. Preliminary Report
G. Draft booklet

List of boxes

3.1 Narrative summary of the decision framework 12

List of figures

3.1 Decision framework for the valuation of peri-urban natural resources 11

List of tables

2.1 Participants in the focus groups: Barikese study 8
2.2 Participants in the focus groups: land conversion study 9

ABBREVIATIONS

DFID	Department for International Development
EIA	Environmental impact assessment
GIS	Geographic Information Systems
NR	Natural resources
NRSP	Natural Resources Systems Programme
PRA	Participatory rural appraisal
PUI	Peri-urban interface
RPCU	Regional Planning Co-ordinating Unit

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1. BACKGROUND AND PROJECT PURPOSE

1.1 Introduction

The research sought to develop and test a decision framework to enable decision-makers to assess the relative worth of peri-urban natural resources in alternative uses. The decision framework aims to facilitate the evaluation of natural resource productivity in alternative uses, for example landuse for agriculture or providing fuelwood compared with conventional "urban" uses, such as housing or manufacturing industry.

Although there has been a considerable amount of work in related areas, such as environmental economics and environmental impact assessment, there remains a need to develop practical methods for assessing the relative worth of natural resource productivity within a peri-urban interface context. This need has been expressed by natural resource managers involved in on-going research projects in peri-urban areas, as well as by DFID programme managers (see Section 1.3).

The decision framework was developed largely through literature reviews, drawing together existing valuation methods to develop an approach for use in a peri-urban setting. The background to the development of the decision framework can be found in the *Preliminary Report* (Nunan and Bishop, 1999 – attached as an appendix to this report). After preliminary testing, the framework was written up in a draft booklet (an appendix to this report), entitled *Valuing Natural Resources in Peri-Urban Areas: a guide for natural resource managers*. This booklet, the main output of the research, sets out why such a framework may be useful and how it can be used. The booklet also contains guidance on which valuation methods are most appropriate for different uses of natural resources.

The framework was tested through two case studies in two city-regions, Kumasi, Ghana, and Hubli-Dharwad, India[1]. The case studies looked at competing uses (existing and potential) of a reservoir and agricultural land in both city-regions. Key findings from the case studies are noted in Chapter 3, but the details of the case studies can be found in Part 2 of the booklet.

1.2 Project Purpose

The purpose of the research was to develop and test methods for the valuation of peri-urban natural resource productivity, addressing Purpose 1 Output 2 of the original logical framework of the Natural Resources Systems Programme (NRSP), Peri-Urban Interface (PUI) programme:

> *Impacts of urban growth on land use patterns and natural resource degradation identified and incorporated into strategies for peri-urban planning and management.*

[1] Hubli-Dharwad and Kumasi are the case study city-regions for the Peri-Urban Interface Production System research programme.

The framework developed from the research is intended to facilitate the analysis of conflicts over the use and management of natural resources between different stakeholders. It is a tool for decision-making and, whilst the framework generates information, it does not, in itself, provide the answers to how a resource should be managed or whose values should dominate. Such decisions are ultimately more political than technical; nevertheless, judicious use of the framework, and the methods presented in it, can provide valuable information to support more sustainable peri-urban planning and resource management.

The logical framework for the Peri-Urban Interface production system was revised in 1998 (after the development of this project proposal), in the light of the 1997 White Paper, *Eliminating World Poverty: A Challenge for the 21st Century*. The new Output that this project supports is:

> *Land use planning and natural resources management strategies which benefit the poor in peri-urban areas developed and promoted.*

The decision framework specifically includes methods for identifying all users and uses of a natural resource and seeks to highlight non-monetary values of uses that, to date, may not have received much attention from peri-urban resource managers. Such uses may include, for example, informal use of a reservoir for bathing and swimming and washing clothes, vehicles and livestock. The framework should contribute to improved strategies for peri-urban planning and management, which can take better account of sustainability issues and the distribution of costs and benefits between stakeholders.

The terms of reference for the research and the logical framework are set out in Appendices A and B of this report.

1.3 Demand for the research

Demand for the research in Hubli-Dharwad and Kumasi was noted through baseline studies which identified areas of inadequate co-ordination between natural resource managers and a lack of tools to assess different types of uses of natural resources (see University of Birmingham *et al.*, 1998 and NRI and UST, 1997).

In terms of managing natural resources within the peri-urban interface, land-use planning and environmental impact assessment are probably the most widely used approaches in natural resource management. Land-use planning involves setting out a development plan for an urban area, guided by policies and plans at regional and national levels. Such plans attempt to guide the expansion of urban areas, converting land and forest areas for residential, commercial and industrial development and building roads. Plans may react to spectulative growth and may respond to forecasts for the expansion of a city, including population growth forecasts.

In many Northern countries, there are moves to make the land-use planning activity more process-oriented and more participative, to encourage genuine involvement by a range of stakeholders in decision-making. This approach is less developed in Southern countries and requires changes in organisational structures and attitudes, as well as resources and facilitative skills. The decision-framework endeavours to address some of the inadequacies inherent in the management of peri-urban natural resources. The framework encourages the identification of stakeholders and their involvement in planning processes.

Similarly, environmental impact assessment (EIA) is widely used to identify the potential adverse impacts of land development in peri-urban areas, and to specify appropriate mitigating measures. As in the case of land use planning, practitioners of EIA have increasingly sought to involve a wider range of stakeholders in the process of impact assessment and mitigation planning.

A persistent challenge for EIA is the difficulty of weighing and comparing environmental impacts and the costs of mitigation, both against each other and against the potential benefits of development activities. The decision framework developed in this project builds on EIA by using information about the physical impacts of changing resource use, while adding an economic dimension to facilitate more direct comparisons of costs and benefits.

1.4 Previous research

The research builds on previous work on the use of economic valuation methods, environmental impact assessment, environmental planning and management and stakeholder analysis. The Preliminary Report reviewed some of these methods (see Nunan and Bishop, 1999). A number of conclusions were reached:

- Different aspects of methods can be drawn on to contribute to the decision framework. These include:
  - using methods developed for environmental impact assessment and environmental management strategies to generate baseline data. Geographical information systems (GIS) can also be used to set out the baseline situation.
  - recognition that some economic valuation methods are easier to use by non-specialists than others.
  - recognition that intergenerational issues, that is concerns about the sustainability of natural resource uses, and concerns about the distribution of costs and benefits, should be reflected in valuations as far as possible.
- There is a range of methods available to identify stakeholders and encourage their involvement in planning processes. Stakeholder analysis is one such approach.
- Any decision framework must account for both formal and customary rights of access and use of natural resources. This is particularly important in a peri-urban setting, where changes from a rural model to an urban regime can lead to conflicts, and where poorer communities often lose out.

The research also made use of previous work undertaken within the Peri-Urban Interface Production System, including R6799, 'Kumasi Natural Resource Management Research Project', R6825, 'Baseline Study and Introductory Workshop for Hubli-Dharwad City-region' and R6949, 'PUI Concepts and Methodologies'. Reports arising from these projects provided information on issues, stakeholders and methodologies.

2. RESEARCH ACTIVITIES

2.1 Introduction

The development of the decision framework largely drew on existing work and methods. A range of approaches was reviewed in the *Preliminary Report*, identifying the strengths and weaknesses of different methods as well as issues to consider when applying the decision framework, such as how costs and benefits of different uses of natural resources are distributed between stakeholders and over time.

The *Preliminary Report* was used to guide the design of research activities in Hubli-Dharwad and Kumasi. Two case studies were chosen in each city-region and written up following the decision framework format. The experience of testing the framework was fed into the development of the booklet.

2.2 Literature reviews

A preliminary literature review was conducted, which revealed that there have been few attempts to make use of a range of assessment methods within a single framework. The review also highlighted the relative lack of application of valuation methods to peri-urban situations.

Literature was reviewed in areas including:

(a) economic valuation methods (including non-market valuation of natural resources);
(b) land use and regional planning methods;
(c) environmental impact assessment methodologies;
(d) valuation of agricultural produce;
(e) attempts to aggregate values of natural resource productivity (e.g. benefit transfer); and,
(f) decision-making tools for natural resource planning and management, including existing planning guidelines and impact assessment manuals.

This preliminary literature review (Berger, 1999) was built on in the *Preliminary Report* (Nunan and Bishop, 1999), which also drew on reports arising from research in Hubli-Dharwad and Kumasi. The *Preliminary Report* also reviewed the contribution that could be made to the decision framework by stakeholder analysis and consideration of property rights and management regimes.

The discussion in the *Preliminary Report* on economic valuation methods largely drew on a publication put together by IIED, which looked at the economic valuation of forest land use options (IIED, 1994). IIED's experience in environmental economics enabled rapid sifting of the literature and the identification of methods and issues of relevance to this piece of research.

2.3 Selection of case studies

One visit was made by a UK team member to each city-region to initiate the fieldwork with local counterparts. Both counterparts had been involved in peri-urban research within the NRSP PUI programme and were familiar with the objectives and process of peri-urban research. Semi-structured interviews were held with key institutions to determine:

- Methods and approaches already in use into which the decision framework could usefully feed.
- The kind of data already collected that could feed into the decision framework.
- Relationships between institutions to identify how organisations could work together to use the decision framework.
- Potential case studies that could be used to preliminarily test the framework.
- Potential constraints to the use of the decision framework.

Lists of people met can be found in Appendices D and E. The decision over which case studies to undertake was also informed by previous research in the city-region under the Peri-Urban Interface research programme. Previous research enabled the rapid identification of suitable locations, as well as issues, and provided contacts in some cases.

In both Hubli-Dharwad and Kumasi, reservoirs and agricultural land threatened by urban development were selected. In Kumasi, the reservoir is a key source of water for the city, whereas the reservoir in Hubli-Dharwad has, in recent years, become too polluted to provide drinking water. By selecting the same type of resources in the city-regions, comparative analysis of the results and method was facilitated. The issues and locations reflect:

- Key peri-urban natural resources.
- Areas of existing or potential conflicts over use.
- The ability to gather adequate information with the resources, and in the time, available.

2.4 Testing the valuation approach

Information to test the framework was generated through key informant interviews with, and surveys of, stakeholders, such as farmers and fisherfolk. Records of land sales and compensation levels were also searched. This preliminary testing involved the use of:

- Agricultural productivity data.
- Substitute goods approach.
- Opportunity costs.
- Travel costs.
- Land valuation.

The case studies are written up in detail in Part 2 of the booklet, following the format set out in Part 1. The time and resources available did not permit the use of more sophisticated economic valuation methods, such as the contingent valuation method. The potential for further valuation is discussed in each of the case studies. The rapid and, relatively, low-cost nature of the fieldwork illustrates what can be achieved through the use of the framework in a fairly rough-and-ready way. Guidance notes for both Hubli-Dharwad and Kumasi can be found in Appendices C and E.

Workshops were not held in Hubli-Dharwad and Kumasi, as suggested that they may be in the project memorandum, as it was felt that they would be more useful once the framework had been tested and the booklet set out in draft form.

2.4.1 Hubli-Dharwad

Unkal tank

The case study of a reservoir in Hubli-Dharwad was based on the Unkal tank (reservoir), just outside Hubli. This was selected because of its location close to the city and because of conflicting demands and uses made of it. These include sewage flowing into the reservoir from uncontrolled housing development in conflict with the past use of the reservoir as a source of drinking water for the city. A number of visits were made to meet stakeholders that use the tank at different times of the day:

- Early morning to speak to stakeholders involved in household and commercial fishing, swimming, household and commercial laundry, carrying water from the tank, the use of the tank for religious purposes and grass collectors.
- Afternoon to speak to stakeholders involved in bullock and buffalo washing, household fishing, household and commercial laundry and vehicle washing.
- Evening to speak to stakeholders involved in commercial and household fishing, recreation, boating and vehicle washing.

Due to the time period during which the research was conducted, the data collected necessarily reflects a seasonal bias (the research was conducted during the monsoon season). Similar surveys would have to be conducted during other seasons to obtain a complete picture of the year-round use of the tank.

Navalur village

Navalur village was selected as a case study due to its proximity to Dharwad and to the National Highway running through Hubli-Dharwad, making it a potentially prime site for development. Data was collected through surveys of farmers and orchard owners and through access to data recorded by the village accountant (including data on labour costs, inputs and income from crops).

2.4.2 Kumasi

Several villages were visited for the two case studies and each was visited at least twice, to gain acceptance of participation in the research and to conduct focus groups.

Barikese reservoir

The Barikese reservoir is one of two main sources of piped water for Kumasi city. Construction of the reservoir in 1965-68 resulted in the relocation of four farming communities to Asuofua, a village about 3 miles outside the northern boundary of the Kumasi Metropolitan area. Over 2,000 people were affected at the time, mainly through loss of farmland. More than 30 years later, their descendants are still feeling the effects. Compensation has only recently been paid. Costs to the communities affected by the development of the reservoir were compared to present uses, including distribution of water to the city and farm and fishing income.

Table 2.1 shows the participants involved in the focus group discussions through which data was collected. Data was also collected from the Ghana Water and Sewerage Corporation, through discussions with staff at the reservoir and water treatment works and observation of tourists visiting the site.

Table 2.1 Participants in the focus groups: Barikese

Village	Focus group participants
Asuofua	Unit Committee Chairman 1 female teacher 6 female farmers 3 young women 2 young men
Nkwanta Penten & Nkwantakese	8 female farmers 5 members of the Catholic Christian Mothers' Assoc. 1 male teacher 1 female teacher
Maban and Barikese	8 fishermen (the period was off-season)

Development of agricultural land

In many villages around the outskirts of Kumasi, agricultural land has been taken for development, often for housing, with adverse impacts on farmers. The two villages selected for the study are within 10 miles of Kumasi:

Apatrapa – 6 miles west of Kumasi and one mile north of the Sunyani road between Asuoyeboa and Tanoso. Population around 1,500.

Emena – 7 miles east of Kumasi and 1.5 miles south of the Kumasi-Accra highway, along a feeder road. Population around 520.

Both settlements have witnessed unprecedented housing development by urban dwellers over the last five years. A standard building plot is one quarter of an acre (about 1,000 m^2 or 0.10 hectare). Consequently the sale of four plots for housing leads to the loss of one acre (0.4 ha) of agricultural land.

Table 2.2 shows the participants involved in the focus groups discussions, through which data was collected. Data was also collected from records kept in the two villages.

Table 2.2 Participants in the focus groups: land conversion study

Village	Focus group participants
Apatrapa	Town Development Committee Secretary (male) 4 female farmers 1 female teacher 1 Town Elder (male) 3 women from the Dorsett Programme
Emena	Queenmother Town Development Committee Chairman 9 female farmers le farmers

2.5 Draft production of a booklet

The final research activity was the development of the booklet, drawing on the literature reviews and fieldwork. Part 1 of the booklet details the process of valuation and Part 2 sets out the details of the four case studies in the format of the decision framework. The experience of collecting and analysing data for testing the framework fed into the guidelines set out in the booklet.

3. OUTPUTS

3.1 Introduction

The outputs set out in the logical framework are as follows:

1. A review of literature in valuing and managing natural resource productivity.
2. A decision framework to assess the relative worth of natural resource productivity within the context of the peri-urban interface. This is set out in the booklet.
3. Dissemination of the framework, with guidelines, through a booklet.
4. Identification of further research directions to apply and refine the approaches.

This chapter briefly discusses the outputs of the research. The main output of the research is the booklet, which can be found in Appendix G and which will be published separately. Chapter 4 discusses the potential dissemination of the booklet.

3.2 Review of literature

The reviews of literature can be found in a review written by Berger (1999) and in the *Preliminary Report* (Nunan and Bishop, 1999 – attached as an appendix to this report). Section 1.4 of Chapter 1 set out some of the points raised from the literature reviews. However, the main purpose of the literature reviews was to identify appropriate methods that could be drawn on in the development of the decision framework.

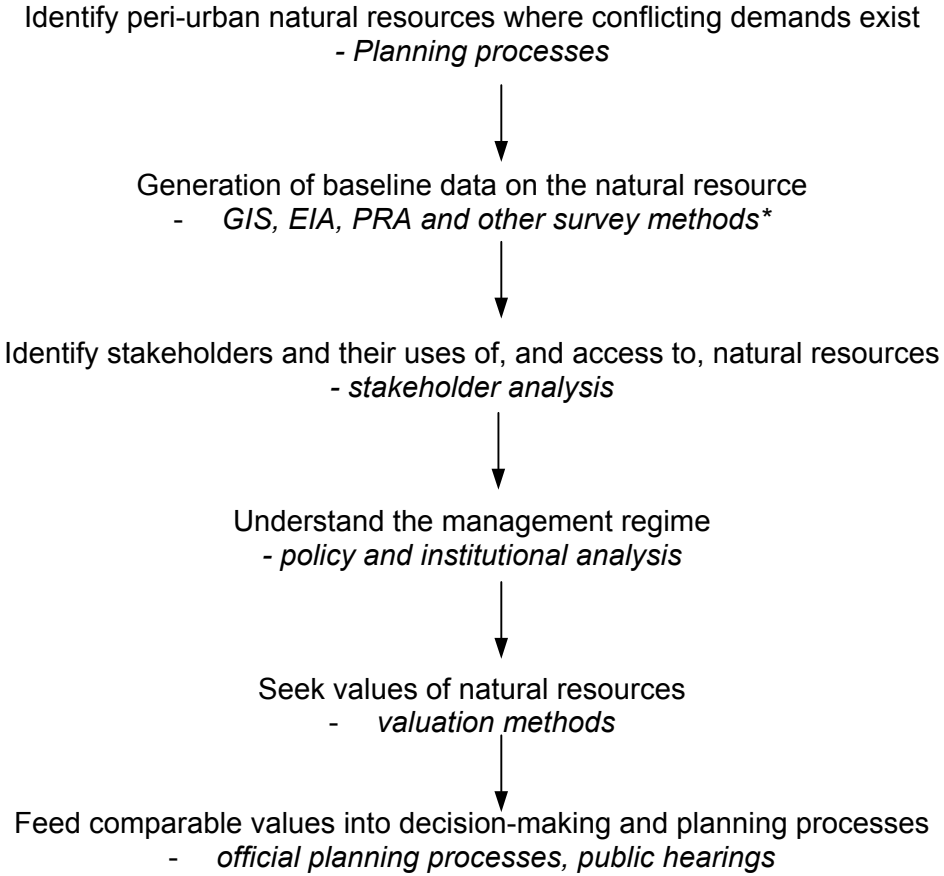
3.3 Decision framework

The main output of the research, the decision framework, is set out in greater detail in the draft booklet. The decision framework is summarised in Figure 3.1 and in Box 3.1. These show the stages through which valuation of peri-urban natural resources can be carried out.

Preliminary testing of the framework concluded that the following elements are critical to its effective use:

- Guidelines on which valuation methods are most suitable in which situations. The booklet, for example, compares economic valuation methods to aid decisions over which methods to use in which situations.
- Stakeholder analysis is essential to identify the uses and users of natural resources and to ensure that as many values as possible are sought.

Figure 3.1 Decision framework for the valuation of peri-urban natural resources



* GIS = Geographic Information Systems; EIA = Environmental Impact Assessment; PRA = Participatory Rural Appraisal

Box 3.1 Narrative summary of the decision framework

Recognise conflicting demands placed on natural resources

- Planning processes.
- Use of consultation methods.
- Responding to complaints.
- Development control – planning permission sought by private sector companies.

Generating baseline information

- Collate and re-interpret existing information from a number of sources – data collected by different organisations, commissioned studies and research reports.
- Conduct or commission studies to collect ecological and socio-economic information.

Identifying users and uses

- Who uses the resource?
  - For what?
  - How often?
- Is anyone excluded from using the resource?
- Are there conflicting demands placed on the resource? If there are, how are these resolved?
- Are there alternative resources the users could have access to, or do use?
  - How do the resources compare?

Understanding the management regime

- Who does the resource belong to and who is charged with managing the resource?
- Are there rules and regulations (both formal and informal) governing the use of the resource? Information may be collected from official sources and through discussions with users.
- What is the nature of the management regime? Does it constrain access?
  - Who constrains access?
  - How? (time, quantity?)
- Are obligations imposed on the users?
  - Who imposes them?
  - What are they?

Valuing the resource

- Identify the major types of value associated with the resource (direct and indirect use, option and non-use value), and relate these to key stakeholder groups.
- Ensure that comparable units of measurement are used and that stock and flow values are not confused.
- Estimate readily accessible values using market prices, substitute goods, replacement and/or opportunity costs.
- Select appropriate valuation methods and conduct relevant surveys as needed to value important non-market values.

Feed into decision-making and management processes

- Use values to compare alternative uses of natural resources and to analyse the distribution of costs and benefits of options between stakeholders.

Whilst the framework can be used to feed into established planning and decision-making approaches within a peri-urban context, there are a number of potential constraints to its use:

- Within the case study city-regions, many public sector agencies with responsibilities for natural resource management do not effectively involve all affected stakeholders in planning and decision-making processes. As the framework requires that all stakeholders and their values of natural resources are taken into account, this may present new challenges, as well as opportunities, for such organisations.

- Following on from this, there is, therefore, a need to widely disseminate the booklet, to contribute to greater understanding of the benefits arising from involving stakeholders in decision-making. The booklet will also encourage recognition of competing demands placed on natural resources and explain how these demands can be interpreted into monetary values.

- A “rough and ready” approach to the valuation of natural resources within the peri-urban interface may generate sufficient information to inform decision-making, rather than using detailed and sophisticated analytical techniques.

The pilot testing led to a slight modification of the decision framework and raised issues to be aware of in writing the booklet. These include the lack of knowledge of stakeholder analysis and valuation methods in many organisations, meaning that the guidelines should be clear and easy to use.

3.4 Dissemination of the framework, with guidelines, through a booklet

The booklet has been written and will be printed for dissemination. A draft dissemination strategy is set out in Chapter 4.

3.5 Identification of further research directions

Further research could involve testing elements of the approach in the case study city-regions, particularly using more sophisticated valuation techniques such as contingent valuation and the travel cost method. This would enable an assessment of the ability of local institutions to use the methods and of the resources required within a Southern country, peri-urban, setting to be assessed.

4. CONTRIBUTION OF OUTPUTS

4.1 Contribution towards DFID's developmental goals

The decision-framework approach should contribute to providing an avenue of consultation for decisions regarding the management of peri-urban natural resources for all groups, including low-income communities. This should improve the transparency of decision-making and ensure that subsistence, recreation and conservation 'uses' of natural resources are taken into account in decision-making, as well as more readily valued uses such as housing or industrial development.

The ultimate beneficiaries of the research are urban and peri-urban consumers, and peri-urban producers and processors. The research should particularly benefit those who have found it difficult to contribute to planning processes and decision-making. It is hoped that the framework will enable many such people, often the poorest, to gain a voice and have their preferences and needs recognised. This will only happen, however, if the booklet is widely disseminated and used. This will, in turn, depend on the booklet being easy to use.

4.2 Promotion pathways

The booklet should be disseminated to:

- Natural resource managers in the case study city-regions.
- Contacts made with state level organisations in India and with national organisations in Ghana.
- Other bodies in India and Ghana with experience in this area, including NGOs and donor agencies.
- Other research projects working in Hubli-Dharwad and Kumasi.
- DFID natural resource advisors and to other aid agencies.

The target institutions in Hubli-Dharwad include:

- District Planning Board due to be formed in Hubli-Dharwad to improve co-ordination between local planning authorities, chiefly the Urban Development Authority and the Zilla Panchayat (District Council).
- Hubli-Dharwad Municipal Corporation.
- Hubli-Dharwad Urban Development Authority.
- Karnataka Urban Water Supply and Drainage Board.
- District Commissioner and the Dharwad Zilla Panchayat.

Contacts have also been made with state-level bodies, including:

- Karnataka State Land Use Board – established in 1996, the Board is in the process of producing a State Prospective Land Use Plan (25 year plan) and determines who uses what land, whilst ensuring that food production requirements are met.
- Karnataka Town Planning Authority.
- Karnataka Forest Department.

- Karnataka State Pollution Control Board – their remit includes, for example, exploring water availability for growing cities.

In Kumasi, the Regional Planning Co-ordinating Unit (RPCU) would be one of the main target institutions. The RPCU is the technical arm of the Regional Co-ordinating Council and is charged with co-ordinating District Development Planning. Other target institutions include:

- Town and Country Planning Department.
- Ghana Water and Sewage Corporation.
- Forestry Department.
- Environmental Protection Agency (the central office in Accra).

In addition, a seminar or workshop could be held in the city-regions. These would enable discussion of the issues and approach set out in the booklet, to generate interest and dissemination of ideas. The workshops would not only be a training mechanism, but also would enable discussion of the practicalities of the use of the decision framework. The booklet could also be distributed to UK-based organisations, such as the Royal Town and Country Planning Institute.

4.3 Further development of the approach

The framework requires further testing and refinement, but should enable decision-makers to see how different uses of natural resources affect the livelihoods of stakeholders. Further work could include:

- Refining the approach through dissemination of the booklet to organisations with experience in economic valuation methods, EIA, stakeholder analysis and environmental planning and management.
- Further testing through workshops and research. The research could involve the use of more sophisticated techniques such as the contingent valuation method, often used by environmental economists to value environmental goods and services.

Training in participatory planning techniques and valuation methods would contribute to the process of improving decision-making within the peri-urban interface. Such training could form part of the dissemination of the booklet, as discussed in Section 4.2.

Both the framework approach and the information generated through the case studies can be used in further phases of the peri-urban research programme, feeding into Activity 1.2:

> NR management and land use planning strategies which will benefit the poor developed.

The logical framework for the Peri-Urban Interface research programme envisages the development of plans for natural resource management and land use. Such plans should feed into, and complement, existing structures of

relevant institutions in Hubli-Dharwad and Kumasi. The booklet could be used as one starting point for the development of natural resource management and land use planning strategies. The approach would fit into an action planning framework and would require stakeholders to work together to agree ways forward.

4.4 Publications

Two internal reports have been produced in the course of the research project. In addition to the publication and dissemination of the booklet, summaries of the research will be distributed electronically and the articles submitted to academic journals.

Berger, R. 1999. *Valuation of Peri-Urban Resource Productivity: Literature Review*. Birmingham, UK: School of Public Policy, University of Birmingham.

Nunan, F. and Bishop, J. 1999. *Valuation of Peri-Urban Natural Resources Productivity: Preliminary Report*. Birmingham, UK: School of Public Policy, University of Birmingham.

REFERENCES

Berger, R. 1999. *Valuation of Peri-Urban Resource Productivity: Literature Review*. School of Public Policy, University of Birmingham, Birmingham.

IIED 1994. *Economic Evaluation of Tropical Forest Land Use Options: A Review of Methodology and Applications*, Environmental Economics Programme. London: International Institute for Environment and Development.

Natural Resources Institute and the University of Science and Technology, Kumasi 1997. *Kumasi Natural Resource Management Research Project: Inception Report*, Volume 1: Main report, DFID NRSP Peri-Urban Interface Production System, Natural Resources Institute, University of Greenwich.

Nunan, F. and Bishop, J. 1999. *Valuation of Peri-Urban Natural Resources Productivity: Preliminary Report*. School of Public Policy, University of Birmingham, Birmingham.

Universities of Birmingham, Nottingham and Wales at Bangor (1998), *Baseline Study and Introductory Workshop for Hubli-Dharwad City-region, Karnataka, India*, Final Technical Report, Volumes 1 and 2, School of Public Policy, University of Birmingham.

APPENDIX A TERMS OF REFERENCE

Taken from “Invitation to Submit Research Proposals: Valuation of Peri-Urban Natural Resources”.

Research Requirements

Peri-urban NR Managers need to have to hand tools which give a clear picture of the relative worth of use of land, water and other natural resources for agriculture, fuelwood growth, aquaculture etc. as opposed to or taken together with more conventional “urban” uses such as housing or manufacturing industry. The intention of this call for submissions is to develop, and carry out a preliminary review with target institutions in the case study regions of methods for the aggregate valuation of natural resource productivity in the peri-urban interface. Attention should be paid to concurrent PUI research work and, where possible and relevant, the review should take place alongside existing research teams. A detailed appreciation should be given of the literature and state of the art in relevant topic areas. It is anticipated that a wide range of valuation techniques will need to be drawn upon and combined, including e.g. conventional land valuation, environmental impact assessment approaches, valuation of agricultural produce.

APPENDIX B LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (OVI)	MEANS OF VERIFICATION (MOV)	IMPORTANT ASSUMPTIONS
GOAL: Productivity and productive potential in peri-urban interface production systems increased through the application of systems-based approaches			
PURPOSE: Impacts of urban growth on land use patterns and natural resource degradation identified and incorporated into strategies for peri-urban planning and management			
OUTPUTS: 1. Reviews of literature and state-of-the-art practice in valuing natural resource productivity and in aggregating those values. 2. A decision framework to assess the relative worth of natural resources productivity within the context of the peri-urban interface. 3. Dissemination of results through a booklet, final technical report and through uptake pathways discussed below. 4. Identification of further research directions to apply and refine the approaches, including identification of further dissemination products.	1. Preliminary literature review completed by April 199. 2. Draft decision framework developed by July 1999. 3. Decision framework completed, ready for further testing and evaluation, by August 1999. 4. Further research ideas identified.	1. Preliminary literature review. 2. Final report and other publications. 3. Booklet published as agreed by NRSP managers. 4. Final report.	*That the decision framework:* 1. Incorporates all aspects of natural resource productivity in the peri-urban interface context. 2. Is taken up by natural resource managers for application to the peri-urban interface. 3. Contributes to improved strategies for peri-urban planning and management. 4. Has relevance to many city-regions, not just the case studies.
ACTIVITIES: 1. Review of literature and experience in relevant topic areas, including environmental economics, land use planning, environmental impact assessment, attempts to aggregate values of natural resource productivity and decision tools already developed. 2. Key informant	BUDGET: Staff £17595 Overheads £6171 Overseas Travel £4080 Miscellaneous £5250 VAT £5250 TOTAL: £35,250 (inc. VAT)	1. Preliminary literature review by April 1999. 2. Draft decision	1. Relevant work accessible and applicable.

interviews with UK-based individuals and organisations, including: lead research teams of the two case study city-regions; managers of programmes within the NRSP and relevant research teams; and UK regional planners and academics concerned with land use and regional planning. 3. Development of an approach or framework to provide aggregate values of natural resource productivity. 4. Testing and evaluation of decision framework with target institutes in the case study city-regions. 5. Publication of a booklet.		framework by July 1999. 3. Draft decision framework by July 1999. 4. Final report by end August 1999. 5. Booklet and other publications by September 1999.	 2. Data available in case study city-regions. 3. Appropriate framework developed for wide dissemination.

APPENDIX C METHODOLOGICAL GUIDELINES

Valuation of Peri-Urban Natural Resources Productivity. Hubli-Dharwad Case Study. Methodology.

NB: please adjust the methodology as necessary having read Dr Nunan's report, and having piloted the methods.

Case Study 1: Unkal Tank.

- use by Karnataka State Urban Water Supply and Drainage Board
    - how much water did they used to extract?
    - date water extraction stopped?
    - reason water extraction stopped (is it really polluted? If so, is it being polluted by the Naveen Hotel? If so, why don't the authorities stop them discharging waste into the tank?)
- size of Tank
    - how many cubic meters of water?
    - how long is the perimeter (edge of lake)?
- population in surrounding/adjacent villages
    - number of people
    - number of households.

Stakeholders	**Number of individuals/ households within this stakeholder group**	**Average value given by this stakeholder group to the resource**
Recreational		
• boating		
• fishing		
Commercial / Household		
• bathing/sanitation		
• clothes washing (commercial)		
• clothes washing (household)		
• fishing		
• irrigation		
• washing buffaloes		
• washing bullocks		
• washing vehicles/machinery		

Calculating Willingness to Pay (WTP) for the Tank.

Recreational Uses.

1. Boating

i.) Boat enterprise owner.

- Average number of boats hired per day.
- Cost of hiring a boat (is it an hourly charge? daily?) (specify unit of measurement in calculations)
- Average annual income from boat hire.

ii.) Boat users.

- Average number of boat users per day (including all boat passengers in hired boats)
- Cost of boat hire (checking answer provided above - triangulation)
- Cost of journey to tank
- Average duration of journey (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average length of time spent at tank per person per visit [this figure will also be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average distance traveled to tank (from home)

2. Fishing (recreational)

- Average number of fishermen per day (take care - higher numbers at weekends likely)
- Any cost associated with fishing at the tank? (e.g. fishing permits)
- Cost of journey to tank
- Average duration of journey (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average length of time spent at tank per person per visit [this figure will also be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average distance traveled to tank (from home)

Commercial / Household Uses.

Bathing/sanitation.

- Average number of people washing/ using the tank for sanitation purposes per day
- Average duration of journey to tank(there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- How do the individuals interviewed value the tank as a place for bathing/sanitation? (qualitative questioning)
- Alternative bathing/sanitation location?
    - Average duration of journey to this location (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]

- Why is the tank preferred?
- If a new water source (borewell, overhead tank) had to be constructed what would the costs be?
    - capital costs - cost of obtaining loan, interest charges
    - recurrent costs - maintenance, electricity, time cost of people pumping water by hand

Clothes washing (commercial).

- Average number of people washing clothes at the tank per day
- Average duration of journey to tank (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average amount of time spent at the tank per person per day?
- Average income from laundry washed at the lake - per person per day. (2 rotis/chapattis per? Plus ½ bag of rice at the end of the season - convert into a cash amount per day)
- How do the individuals interviewed value the tank as a place for washing laundry? (qualitative questioning)
- Alternative laundry location?
    - Average duration of journey to this location (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
    - Why is the tank preferred?
    - If a new water source (borewell, overhead tank) had to be constructed what would the costs be?
        - capital costs - cost of obtaining loan, interest charges
        - recurrent costs - maintenance, electricity, time cost of people pumping water by hand

Clothes washing (household).

- Average number of people washing clothes at the tank per day (representing how many households)
- Average duration of journey to tank (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average amount of time spent at the tank per person per day?
- How do the individuals interviewed value the tank as a place for washing laundry? (qualitative questioning)
- Alternative laundry location?
    - Average duration of journey to this location [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
    - Why is the tank preferred?
    - If a new water source (borewell, overhead tank) had to be constructed what would the costs be?
        - capital costs - cost of obtaining loan, interest charges
        - recurrent costs - maintenance, electricity, time cost of people pumping water by hand

Fishing (commercial).

1.) Fishing Contractor

- What price does he pay for the contract per year?
- What income does he gain from the contract (e.g. sub-contracting)

2.) Fishermen/women. (5 contracting households - plus any others?)

- Average number of people fishing at the tank per day - representing how many households?
- Average duration of journey to tank (there and back) [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
- Average amount of time spent at the tank per person per day?
- Average income from fish caught at the lake - per person (or per household - which ever unit of measurement works better) per day.
- Alternative sources of household income?
- Alternative fishing location?
    - If there is an alternative… average duration of journey to this location [this figure will be multiplied with the wage rate, to calculate the opportunity cost of people's time]
    - Why is the tank preferred?

Irrigation.

- how many hectares are irrigated around the tank?
- how many farm households does this benefit (farm households, farm labourers?)
- what is the average increase in crop yield as a result of irrigation? how much does this increase the income per hectare?

$\Rightarrow$ this will give the benefit from irrigation per hectare

- what are the alternative sources of irrigation? What would they cost (capital and recurrent costs per hectare)?

Washing buffaloes.

- how many buffalo owners are there in the communities around the tank?
- how many buffaloes?
- on average, how often do the buffalo owners bring their buffaloes to be washed?
- how long does the journey take to bring the buffaloes to the tank (there and back) (average)
- how long does the buffalo owner spend at the tank each visit (average)
- alternative washing site
    - how long does would the journey take (there and back) (average)
    - why is the tank preferred?

Washing bullocks.

- how many bullock owners are there in the communities around the tank?
- how many bullocks?
- on average, how often do the bullock owners bring their bullocks to be washed?
- how long does the journey take to bring the bullocks to the tank (there and back) (average)
- how long does the bullock owner spend at the tank each visit (average)
- alternative washing site
    - how long does would the journey take (there and back) (average)
    - why is the tank preferred?

Washing vehicles/machinery.

- how many vehicle or machinery owners bring their vehicles to be washed at the tank (average per day)?
- on average, how often do the vehicle or machinery owners bring their vehicles or machinery to be washed?
- how long does the journey take to bring the vehicles or machinery to the tank (there and back) (average)
- how long does the vehicles or machinery owner spend at the tank each visit (average)
- alternative washing site
    - how long does would the journey take (there and back) (average)
    - why is the tank preferred?

Brick making.

Does brick making take place using resources from the tank? If so, how can we place a value on this activity?

Farmers - taking tank silt.

Do any farmers from the surrounding area take tank silt from Unkal Tank? If they do, what value can we place on the silt taken (amount taken, hectares of land improved with silt, enhanced productivity of land - resulting in 'x' increase in yield, and 'y' increase in income - or preventing 'z' decline)

Hotel Naveen.

What benefit does the hotel gain from its location?

- attractive location - how to value this?
- free sewage disposal - cost of connection to HDMC sewage system

Others?

Please list any other stakeholders and develop a methodology to discover the value that they place on the resource provided by the tank. (E.g. There is a group of people camping on the shores of the lake. What are they doing there? How long do they spend there? What benefits do they gain from the lake? Can you put a value to them?)

Case Study 2: Agricultural land at risk from encroachment.

General information required:

- population (individuals, and number of households
- hectares of land belonging to village
- land quality (numbers of hectares under different qualities - e.g. waste land, wooded, orchards, grazing, high quality agricultural land, lower quality agricultural land, land covered by urban uses - housing, enterprises etc)
- list of stakeholders (users of natural resources) - to improve the list below.

Stakeholders	**Number of individuals/ households within this stakeholder group**	**Average value given by this stakeholder group to the resource**
• landowning households		
• orchard owners (not owning other forms of agricultural land)		
• landless agricultural labourers		

• livestock owners
  • landless
  • landed		

• firewood collection		
• Nomadic people (camping)		
• Nomadic people (shepherds)		
• others?		

<u>Calculating Willingness to Pay (WTP) for the Land based resource.</u>

Landowning households.

1.) Calculate the return per hectare. (i.e. the income/ha./year)

- average income per hectare under each crop grown in the area. Average it.

2.) Average market price for land, per hectare.

- under agriculture
- for sale to a developer (for conversion)

3.) Other sources of land-based value?

Landless agricultural labourers.

- Average labour days per hectare. [Number of agricultural labourers employed per hectare per annum]
- Multiply labour days/ha by average wage rate (average annual income figure/ha)
- Give as an average figure per hectare per day.
- Alternative source of livelihood? Why is agricultural work preferred?

Livestock owners (Landless).
Grazing/fodder, supports livestock.
- number of households in this category owning livestock
- number of livestock
- where do they get fodder?
- volume of fodder required (average, per year)
    - Market value of fodder
    - Cost of 'free' fodder
        - labour costs - herding, cutting, duration of travel to and from, duration herding, or cutting - multiply by wage rate (for children @ Rs. 25/day)

Livestock owners (Landed).
Grazing/fodder, supports livestock.
- number of households in this category owning livestock
- number of livestock
- where do they get fodder?
- volume of fodder required (average, per year)
    - Market value of fodder
    - Cost of 'free' fodder
        - labour costs - herding, cutting, duration of travel to and from, duration herding, or cutting - multiply by wage rate (for children @ Rs. 25/day)

Firewood collection.
- Who collects firewood?
- Where is firewood collected from?
- How far is it from the village? (Journey duration time)
- How often (average) does a member of the household have to collect firewood? (frequency)
- What other fuel sources are there?
- How much do they cost? How long do they take?
- Why is wood preferred/not preferred?

$\Rightarrow$ gives value of firewood (through opportunity cost of time, and value of alternative)

Nomadic people (camping).
Generate a value using the best estimate that you can.

Nomadic people (shepherds).
Generate a value using the best estimate that you can. Income from fertilising fields and from livestock products (milk, meat, hide/leather etc.)

Methodological Notes:

Opportunity cost of people's time.
e.g. using the duration of a journey to a resource - multiplied with the wage rate.

Wage rate @ Rs.40/day (adults) or @ Rs. 25/day (children). Divide this by hours in the working day to calculate the hourly rate of pay. wage rate

⇒ **Add to each interview:**

- Is their access to the resource constrained?
    - by whom?
    - how? (time, quality?)
- Are they aware of other users and uses of the resource?
- Are there conflicting demands placed on the resource? If there are, how are these resolved?
- Are obligations imposed on the users?
    - who imposes them?
    - what are they?
- Do they have to pay anything to use the resource?
    - how much?
    - who to, and how often?
- Who does the resource belong to and who is charged with managing the resource?
- Is anyone excluded from the resource? (NB: for the agricultural land case study, is there any common land? If so, how is it managed? Who is allowed access, who is not?

Are there any local studies which might help to ascribe a ***'non-use value'*** to the case study sites? All the modes of valuation being used so far are in relation to how valuable to resource is to humans, rather than in its own right. (e.g. importance as a bird breeding site, for rare flora or fauna?)

APPENDIX D KEY INFORMANTS IN BANGALORE AND HUBLI-DHARWAD

People met - Bangalore

Person	Organisation	Location	Contact Details
Mr B. Srinivasareddy (MD) (could meet Mr. S.C. Malagi, Chairman)	Karnataka Urban Water Supply and Drainage Board	Kempegowda Road. Bangalore 9.	Switchboard 221-3658, or 221-7739
Dr Ravendra (MD)	Karnataka State Urban Planning Organisation (no longer exists) Functions now undertaken by: Karnataka Urban Infrastructure Finance Development Corporation	KSCMF Building. 3rd Phase. 2nd Floor. Cunningham Road. Bangalore 52.	
Dr. M.H. Swami Nath Director of Forest Research	Forestry Department (also explained the functions of the Forestry Development Corporation)	Forest Department Aranya Bhavan 18th Cross. Malleshwaram. Bangalore 3. Karnataka Forestry Development Corporation Ltd. 18th Cross. Vanivalas. Malleshwaram. Bangalore 3.	Tel: 334-3463 / 334-7069 / 336-7123 email: westghat@satyam.com Tel: 334-5348 / 334-5548 / 348-2549
1. **Dr. M. Mallapa** (Director, Land Use Board) Not available for meeting. 2. **Mr. M.R.S. Rao** - met and discussed research objectives	Karnataka State Land Use Board, Karnataka State Department of Agriculture	Seshadri Road, Bangalore, 560-001	1. Tel:227-5038 2. Tel: 227-5038
Mr. V.M. Hegde	Karnataka State Town Planning Department	MS Building (next to Vidhana Soudha) Gate 3, Dr Ambedkar Veedhi, Bangalore 1	Tel: 225-8988
Ms. Chandrani Sengupta and **Mr Gururaja Budhya** and Dinesh?? **Solly Benjamin**	TIDE - Technology Informatics Design Endeavour Consultant/Researcher associated with TIDE		TIDE offices Tel: 346-2032 / 344-2751 Tel: (r) 349-4737 / 553-1320 / 5525485 / 349 - 1174 tide@blr.vsnl.net.in dinesh@tide-india.org dinesh@tide.dabang.ernet.in

People met – Bangalore continued

Mr Shivalingaiah	Karnataka State Pollution Control Board.	6,7,8 Public Utility Building. MG Road.	Tel: 558-8151
Jayakar Jarome (Housing Commissioner), or	Karnataka Housing Board	Cauvery Bhavan, Kampegowda Road. Bangalore 9.	221-3592
Mr. H. Bhaskar (Project Co-ordinator)	Directorate of Municipal Administration	9th Floor. VV Towers. Dr Ambedkar Veedhi Road. Bangalore 1.	Tel: 286-6302 / 286-3576 Fax:286-6302

People Met - Hubli-Dharwad

Person	Organisation	Location	Contact Details
Sri H. Siddaiah Mr. Subbe Gowda Executive Engineer	Karnataka Urban Water Sewerage and Drainage Board. Sub-Division Dharwad.		Tel: (o) (0836)-348-680 (r) (0836)-772-384 Tel: (o) (0836)-347-206 (r) (0836)-777-520
Mr Jagdesh	HDUDA (Hubli-Dharwad Urban Development Authority		Tel: (0836)-224-274
Mr I.H. Jagdeesh Assistant Environmental Officer	Karnataka State Pollution Control Board.		

APPENDIX E NOTES FROM KUMASI VISIT BY PROJECT LEADER

During the visit, a number of meetings were held with various stakeholders, including:

- Owusu Achiaw, Town Planner, Town and Country Planning Department
- Mr Asare, Forestry Department (Manager of the Collaboration Unit)
- Kenneth B. Maison, Ghana Water and Sewage Corporation (GWSC)
- Mr Mantey, Director, Regional EPA
- Mr Asigri, Town and Country Planning Department (also involved in the Regional Co-ordinating Unit)
- Land Valuation Department (part of the Lands Commission)

From these meetings, we concluded that there were four possibilities for testing out the decision-framework:

1. Barakese reservoir.
2. Floodplain in Kumasi – a project, Kumasi Improved Drainage Project, which could provide more land for development and decrease the floodplain. We do not have any material on this project, but will try to find out more and sketch out a possible valuation approach in the report on Kumasi.
3. Agricultural land that could be developed.
4. Sand and gravel extraction from rivers – taking sand and gravel for construction and causing rivers to become increasingly sedimented and stagnant.

In terms of ease of access to information, we decided that we would attempt to value the Barakese reservoir and two sites of agricultural land that are in areas where development is a strong possibility.

Barakese reservoir
Main reservoir that provides water for Kumasi and many surrounding villages. Fishing is allowed. Compensation has recently been paid to farmers for their loss of land – taking into account size of plots and crops. There are many visitors to the site, but these may come to see the water treatment works, as much as the reservoir. The reservoir is artificial and has been created from a river.

Stakeholders
- GWSC – the corporation and the employees?
- Urban dwellers
- One local villages – fishing
- Resettlement village – levels of compensation, previous uses (and values of) of the river.

Approach
- More information about compensation.
- PRA – what kind of access do villagers and employees have for fishing?

- Fishing – levels of catches, what do they do with the catches – if they sell any of it, how much for and if it is for home consumption, how would they have had to pay for it.
- Could find out more information about the ecological functions of the reservoir?

Agricultural land that could be developed
Description of the areas in terms of agriculture and development activities.

Stakeholders
- Perspective developers
- Land owners
- Farmers
- Planning authority
- Politicians
- Community

Information on
- Agricultural productivity and crop prices
- Land values when sold – who gets what revenue?
- What, if any, compensation do the farmers get?

Report
We hope to conclude this research by the beginning of August. The Kumasi report will include:

- Descriptions of the resources.
- Description of the stakeholders, the types of decisions made about the resource (by whom?) and the implications of those decisions.
- Approaches used.
- Comments on the approaches, including how they would complement methods already used, and thoughts on further research.