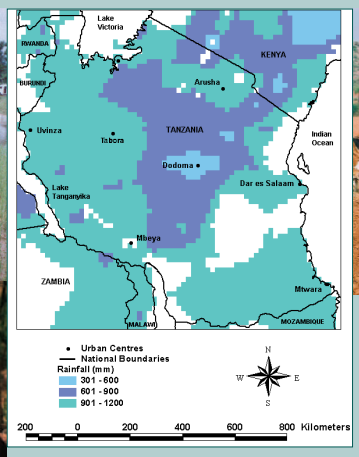
DFID Natural Resources Systems Programme

The Characterisation of Six Natural Resources Production Systems

J. Taylor, M. Tang, C. Beddows, F.M. Quin, M.A. Stocking



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PREFACE

This Characterisation Study was funded as part of the Project Development activities of the Natural Resources Systems Programme (NRSP). Dr FM Quin (the NRSP Programme Manager, April 1999 to April 2003) and Professor MA Stocking (member of the NRSP Steering Group) developed the method that was used for the Study and oversaw the work, providing technical advice and contributing to the writing of this report. Jeremy Taylor, a Research Associate with the Overseas Development Group, University of East Anglia (ODG-UEA), was responsible for assembling and compiling the data and other supporting information by country and production system. ManFai Tang of HTS Development Ltd assisted in the production and compilation of the physiographic characterisation maps, refinement of the method for systems comparisons and prepared the initial draft of parts of this report. Carl Beddows (also with HTS Development Ltd) provided technical guidance to Jeremy Taylor on the use of GIS software and assisted with assembling some data sources.

Other technical and administrative support provided by ODG-UEA and HTS Development Ltd is gratefully acknowledged. Thanks also expressed for the support and encouragement for undertaking the Study provided by the DFID Adviser to NRSP, the late Derek Sutton.

NRSP
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CONTENTS

APPENDICES

LIST OF MAPS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The Natural Resources Systems Programme (NRSP) is part of the Renewable Natural Resources Research Strategy (RNRRS) of the UK Department for International Development (DFID). Within the RNRRS there are ten NR research programmes which variously conduct research in the context of six Production Systems (PSs): the High Potential (HP), Hillsides (HS), and Semi-Arid (SA) PSs and the Forest Agriculture (FA), Land Water (LW), and Peri-Urban (PU) Interfaces. NRSP addresses all these systems and, from April 1999, following DFID's requirements, has focused on either two or three target countries per PS variously covering Sub-Saharan Africa, South Asia, and Latin America and the Caribbean. NRSP's research is conducted through commissioning research projects for each PS portfolio, giving a total portfolio of 30-50 projects.

In the first four years of the programme, prior to April 1999, budget allocations between the PSs and target countries had evolved on a somewhat *ad hoc* basis reflecting both historical precedent and the interests and activities of particular research institutions and scientists. In 1999, following review of the NRSP Annual Report for 1998-99, DFID queried the basis for deciding funding allocations between PSs. In addition, the UK Government's 1997 White Paper 'Eliminating World Poverty: A Challenge for the 21st Century' had significantly shifted DFID's developmental policy focus to poverty reduction and livelihoods improvement. In common with other programmes of the RNRRS, this led to a refocusing of NRSP's research (as from April 1999). In addition, DFID's query combined with the required poverty-focus for NR research prompted NRSP to undertake the Systems Characterisation Study to provide, in terms of the donor's policy priorities, a basis for identifying priorities between the six PSs and their target countries. The Study therefore served as a guide to research planning in the second term of the programme, 1999-2005.

A method was developed for the Study. As a first step, definitions and, where necessary, alternative definitions, were devised for each PS in its respective target countries and used to set the boundaries of the PSs. PSs were then characterised on the basis of twelve variables which nested into six Characterisation Criteria. All criteria either directly or through proxy variables were measures of the donor's policy priorities and enabled an assessment of 'need' for research. The criteria covered: land area, human population, market feasibility (infrastructure and within PS market demand), land productivity and export potential (national and international market demand), poverty status (GDP; literacy rate; child nutritional status), and national NR management knowledge base (national support to NR research and national numbers of NR scientists). The PSs were mapped and data were assembled and used to assign values for the variables of the criteria to each PS. Data sources were various published and unpublished documents and the Internet. The data were input to an Excel Workbook (one worksheet per target country) together with explanations as to how the data were derived for the PS(s) of each target country. A supporting Map Album was also created covering all target countries to show the extent of a PS in each country and the extent of the main factors that determined each PS definition on a country by country basis.

Using the target country PS datasets for the six main characterisation criteria, a master spreadsheet for the criteria for the six PSs was developed and then comparative spreadsheets were developed for three PS dataset versions. These three versions took account of some alternatives for PS definition in respect of the HP, SA, FA and LW PSs. The data of each dataset version were compared using simple ranking (scale of 1 to 6, with 6 defining the value with greatest need) and relative ranking (1 defines greatest need value with all other values expressed as a proportion (less than 1)). Weights were decided for the six criteria and, in order to examine the findings from different biases, five weighting scenarios were analysed. A total 'need' score was then generated for each PS in each scenario, which equalled the sum of the multiples of weight by criterion ranking values across the six criteria. Following the same procedure, an additional dataset was developed and analysed by relative scoring that made corrections for the double counting of population in PSs that had overlapping land areas in some target countries e.g., HP and LW in Bangladesh.

The results of these analyses were then compared by considering (A) the overall PS rankings averaged across five scenarios and three PS dataset versions; (B) the PS rankings for the Version 3 of the PS dataset (the version that most closely represented the geographical scope of NRSP in year 2000) and (C) the PS ranking for the weighting scenario that gave a greater weighting to poverty status.

Irrespective of the varying PS definitions and alternative ways of comparing between PSs to assess relative importance, there were no significant differences in the conclusions reached. The PS ranking in respect of highest to lowest priority was SA, HP, FA, LW, HS, and PU. In terms of proportional need (and therefore priority), SA and HP formed a distinct pair with high priority; FA and LW were a closely middle ranked pair; and HS and PU were a similar lowest ranking pair. In the Scenario with greater weighting to poverty status, LW remained in the middle rank but moved slightly higher than FA.

Overall, there was a close correspondence between assessed need and actual planned budget allocations for the 1999-2002 and 1999-2005 programme terms. The main difference was that whilst SA had the greatest fund allocation, it was not as high as the ranking indicated while FA, LW and PU had slightly more than the ranking indicated.

The target countries of each PS were a factor in the rankings that were identified. For example, the large national populations of some target countries e.g., India was a major factor in the high priority indicated for SA and HP. The low values for poverty status of Bangladesh combined with a higher population were the reason for LW rising slightly higher in the rankings in Weighting Scenario 4.

The results of the Characterisation Study were used both as an information source on PSs and as guidance for research planning.

1 INTRODUCTION

1.1 SYSTEMS CHARACTERISATION OVERVIEW

This document reports on the characterisation of the six production systems that are one of the main features of the design of the Renewable Natural Resources Research Strategy (RNRRS) of the UK Department for International Development (DFID). The assignment – the Systems Characterisation Study – was undertaken by the Natural Resources Systems Programme (NRSP), one of the ten research programmes that comprise a major part of the RNRRS. NRSP was solely responsible for the decision to undertake the Study and for the method followed. Both the characterisation criteria that were used and the rationale behind the analysis of the characterisation data were those which best suited the reasons for NRSP's decision to undertake the Study.

The Study[1] took place in late-2000. This timing was just under halfway through NRSP's planned ten-year term and about two years after the UK Government had issued its White Paper 'Eliminating World Poverty: A Challenge for the 21st Century'. The White Paper gave rise to major policy shifts in DFID, in particular the prioritisation of poverty reduction and major emphasis on the sustainable livelihoods approach. In turn, although still within the context of the RNRRS, this led to some re-focusing of DFID's natural resources research, including that of NRSP, to ensure that it could contribute to DFID's developmental aims, centred on the Government's commitment to the internationally agreed target for poverty reduction.

The task of re-focusing NRSP's research agenda coincided with the time at which NRSP came under new management[2]. At this time, it became evident that there was a need for the programme to have a sounder basis for priority setting, including the relative scale of attention to the six production systems of the RNRRS, all of which the programme covered[3]. This coincided with receipt of a query from DFID (as a result of the review of the Programme's Annual Report for the year April 1998 to March 1999) regarding the basis for the allocation of funds between production systems and the possibility of establishing priorities based on such characteristics as the number of people living in a defined system, how poor they are etc. Hence the decision to proceed with the Systems Characterisation Study with the aim of enabling the NRSP management team to make a relatively robust assessment of priorities between the six production systems, including the implications for appropriate levels of fund allocation. An important qualification regarding this aim is that it was grounded in DFID's policy priorities and, relative to this, the specified objectives of NRSP. Thus the *key driver* underlying the Study's method, particularly the decisions taken on how to characterise the production systems, was to develop profiles that either directly or indirectly through suitable proxy indicators were linked with poverty assessment and the opportunities for livelihood improvement.

The Study had *three main areas of work*: (a) characterisation of each of the six production systems against a set of common criteria; (b) the use of the data and information for these criteria to make relative assessments of priorities between production systems; and (c) demonstration of a simple procedure by which to make assessments of certain aspects of research priority setting relative to a donor's (DFID in this case) defined developmental objectives.

Section 2 introduces the six production systems and the target countries in which the research for each of these is conducted. This information closely reflects the baseline information available to the NRSP management team in April 1999. Section 3 expands on the guiding principles of the Study and describes the methods and sources used. Section 4 discusses the Study's findings, drawing upon the analysis presented in Appendices 2 to 4 of this report.

[1] / NRSP reference number PD092.

[2] / DFID awarded Hunting Technical Services Ltd (now HTS Development Ltd) the contract to manage NRSP as from 1 April 1999.

[3] / Although the six production systems (PSs) provide an important planning matrix for the RNRRS, each of the ten research programmes do not necessarily conduct research in each PS. However, NRSP's research does address all six PSs.

Section 5 takes the form of a map album, with supporting notes, covering each of NRSP's target countries. The maps and notes define and highlight specific features of the production system(s) in a target country. Where relevant, a suite of maps (climatic, edaphic, eco-physiological) are provided to explain how decisions were taken on the boundaries of a production system in a particular country. The detailed profile sheets for the target countries in Appendix 1 underlie the supporting notes in Section 5.

The bibliography of the Study is provided in Section 6.

1.2 USING THE FINDINGS OF THIS REPORT

Although a complex of factors – economic, political, scientific and logistical, – come into play in deciding funding allocations for research, the potential *developmental impact* of the research arguably is the major baseline issue. In the context of DFID's policy priorities this could be defined as how many poor people may *benefit* by a piece of *research* and do these poor people satisfy the primary criterion for disbursement of DFID's *development* assistance? Other considerations could be what size of land area might be affected and the environmental implications; the possible scale of potential contribution to national economies; and the capacity for local (national) implementation and uptake.

The *answers* to these questions on the *scale* of potential impact of the application of research findings and *who* and *what* will benefit could provide a research programme, such as NRSP, with a baseline of information by which to make decisions on the allocation of research resources. These answers are not meant to be a straitjacket on priority areas for funding. However, where existing allocations differ significantly from allocations indicated by the assessments of need and potential impact, grounds are provided for questioning and re-assessing funding decisions.

Setting *boundaries* to production systems is an important aspect of their characterisation. The Study considered definitions very carefully in the context of the target countries involved and the definitions applied by others, including the donor. As a result, the definitions applied in the Study are not uniform across all the target countries of a specific production system. The treatment of each target country as its own individual case resulted in country-specific definitions for the production system(s) concerned. After making best judgements for the production system boundaries and assembling data for the characterisation criteria, the findings of the Study have provided a guide to:

- Relative priorities between the six production systems
- Allocation of the available budget to the defined production systems
- Allocation of the available budget to specific target countries
- Deciding priorities for commissioning of future research

An important feature of the work is that *flexibility* is built into the method used for the relative assessment of production systems and priority identification. Hence, within the framework of this method, it is possible to go beyond what is considered in this report, to generate results for additional policy-related priorities and production system potentials.

2 NATURAL RESOURCES SYSTEMS PROGRAMME (NRSP)

2.1 OVERVIEW OF NRSP

In common with all research programmes of DFID's RNRRS, the Natural Resources Systems Programme (NRSP) has a ten-year life from April 1995 to March 2005. The programme's purpose is to deliver new knowledge that can enable poor people who are largely dependant on access to and use of natural resources (NR) to improve their livelihoods. The central focus of NRSP's research is ways and means to improve the management of natural resources covering three inter-related fields – the NR-base itself; the integrated and dynamic nature of people's livelihoods and how these affect their decision-making and capacity to use and manage the NR-base; and the institutional environment in which NR management strategies are designed and implemented.

The programme is implemented through a competitive grant award scheme for commissioning of individual projects. Over time, this scheme has established an annual portfolio of some 30-50 research projects. While each project has its own individual objectives, all are designed to contribute to the attainment of both NRSP's overarching purpose, and the objectives that DFID specified for NRSP with respect to each production system of the RNRRS. Projects are of varying duration (from 3 months to 3 or 4 years) and are carried out by overseas and UK-based organisations.

2.2 PRODUCTION SYSTEMS AND TARGET COUNTRIES

2.2.1 Summary

The RNRRS defines *six production systems* for the total scope of its natural resources research and NRSP addresses all these, namely:

- High potential production systems (HP)
- Hillsides production systems (HS)
- Semi-arid production systems (SA)
- Forest agriculture interface (FA and FAI)
- Land water interface (LW and LWI)
- Peri-urban interface (PU and PUI)

In its original design, from two to six countries were targeted for NRSP for each production system (PS) but as from April 1999, in line with a directive from DFID, NRSP limited project commissioning to a maximum of three countries per PS. The target countries are variously located in three target regions (Sub-Saharan Africa, the Indian sub-continent, and Latin America and the Caribbean).

Details of the target countries and the production systems that NRSP's research addresses in these countries are shown in Table 2.1 (see following page). In conformity with the RNRRS, for the purpose of defining geographical coverage of the LWI, the term 'target country' is applied to the Caribbean region.

2.2.2 High Potential Production Systems

High potential production systems are found in regions characterised by a favourable climate, relatively fertile soils and considerable ground water resources in some instances. These systems also have high population densities commonly associated with small land holdings and circumstances that intensify the use of land for arable cropping. Recent and current projects concern irrigated production systems in Bangladesh and the lower Indo-Gangetic Plains in India, and rainfed upland systems in south western Kenya and eastern India. For varying reasons, in spite of the high potential of the NR base, the rural populations in the areas targeted by NRSP are distinctly poor and disadvantaged, presenting a considerable challenge to the ways by which NR management research could assist livelihood improvement. On-going and planned projects emphasise integrated participatory approaches to raising awareness of options for farming-based enterprises and the management of farm

land and water resources, and link these with the identification and testing of forms of rural service provision that are relevant to and can reach poor people.

2.2.3 Hillsides Production Systems

Hillsides production systems are characterised by farming activities (crops and livestock) on steep slopes where difficult terrain results in poor accessibility, limited infrastructure and markedly impoverished communities. Use of these marginal lands has led to their degradation with soil erosion, declining soil fertility and deforestation all contributing to low productivity. In addressing these land management problems, NRSP adopts a holistic strategy towards the development and promotion of improved farming strategies that meet the needs of marginal farmers. Current projects are in Bolivia, Nepal and Uganda. All projects, in varying ways, emphasise the factors that limit people's adoption of available technologies for improving their management of natural resources.

Table 2.1: NRSP Target Countries by Production System, as of June 2000

Region	Countries	Systems					
		HP	HS	SA	FA	LW	PU
Sub-Saharan Africa	Ghana				■		■
	Kenya	■					
	Tanzania			■			
	Uganda		■			tbd*	
	Zimbabwe			■			
Indian Sub-Continent	Bangladesh	■				■	
	India	■		■			■
	Nepal		■		■		
Latin America & Caribbean	Bolivia		■				
	Brazil				■		
	Caribbean					■	

■ Target country for projects tbd To be decided after reviewing the output of a programme development study

2.2.4 Semi-Arid Production Systems

Semi-arid production systems characteristically occur where agricultural activities and livelihood strategies are constrained by poor natural resources (principally low and erratic rainfall and infertile, poorly structured soils). Although past projects were conducted in Kenya, Nigeria, Tanzania and Zimbabwe, the current target countries are India, Tanzania and Zimbabwe[4]. Recently completed projects in Tanzania and India have centred on the understanding of livelihoods of the poor, in respect of coping strategies, dependence on common pool resources (CPRs), and NR management strategies. Based on this understanding, research for the final years of the programme term will focus on the development and promotion of improved strategies for NR management under varying land and water tenure regimes.

2.2.5 Forest Agriculture Interface

The forest agriculture interface targets areas that are in transition between primary forest on the one hand and settled agricultural land use on the other. Two land use dynamics are identified, the first involving initial forest conversion and the second involving the development of subsequent types of land use. Features of the FAI vary between target geographic regions (i.e., between West Africa, Amazonia in Latin America and the hill zone of Nepal). However, a common feature in terms of people's livelihoods is that interdependency between crops and forests or tree-based systems is integral to all three, possibly with livestock as an additional common feature. Current and planned projects concern the assessment and further development of: participatory approaches to CPR management; improved land use; and strategies to improve the integration of livelihood perspectives into NR management policies.

[4] / Zimbabwe was phased out as a target country in early 2001, after this Study was completed.

2.2.6 Land Water Interface

The land water interface is located in regions where both aquatic and terrestrial resource systems co-exist in space and time. The interface targets two ecosystems – coastal zones and floodplains. The Caribbean is targeted for the coastal zone, with priority given to the aquatic environment, emphasising coral reefs and lagoons, mangroves and sea-grass beds. In addition, in order to address impacts on that environment, the research takes a wider approach to production constraints and considers land use practices and zoning in coastal ecosystems. In this way, the research aims to establish appropriate management actions to address all factors that may impact on the target habitats. Bangladesh is the target country for floodplains research. A similar conceptual approach as that for coastal zones applies for this inland aquatic system. A broad approach is taken to production and management constraints in order to consider all possible influences on the LWI. To date the portfolio has concerned livelihood strategies in the LWI and new approaches to integrated NR management that can benefit the poor. The future portfolio will include more projects relating to institutional arrangements for sustained uptake of improved management strategies. The lakeshores of the Lake Kyoga inland wetland system in Uganda may be added (for the floodplains ecosystem), dependent on the outcome of a Programme Development assignment, which is currently underway, and available funding[5].

2.2.7 Peri-Urban Interface

The peri-urban interface is created by urban development. As urban activities grow and spread, links or impacts upon rural activities in the countryside are created. These cause changes to existing production systems and create new ones that can affect the poor in both urban and rural areas. Opportunities arise from easier access to urban markets, services and jobs, and the re-use of urban wastes. Problems arise from the conversion of land, urban pollutants, farm labour shortages and the loss of natural resource based means of livelihood. During the first phase of NRSP, projects generated substantial new knowledge of peri-urban natural resource use in livelihood strategies near to Kumasi in Ghana and the twin towns of Hubli and Dharwad in India. New projects are underway to test the validity and utility of the new knowledge in bringing about pro-poor changes in natural resource management through the creation – using participatory processes – of action plans that will be implemented in pilot projects.

2.3 PURPOSE OF THE SYSTEMS CHARACTERISATION STUDY

As stated in Section 1, the purpose of the Study was to enable the NRSP management team to make a relatively robust assessment of priorities between the six production systems, including the strategic implications for appropriate levels of fund allocation. The assessment is based on a characterisation of each production system against a set of common criteria. In line with DFID's policy and development priorities, these criteria enabled the development of profiles that either directly, or through suitable proxy indicators were linked to assessments of poverty and the opportunities and constraints within each production system for achieving livelihood improvement.

[5] / Although the Programme Development study had favourable findings with respect to NRSP-LW in Uganda, budget restrictions prevented the intended follow up.

3 SYSTEMS CHARACTERISATION – METHODS AND SOURCES

3.1 CRITERIA FOR SYSTEMS CHARACTERISATION

The production systems in each target country were characterised in terms of the following six main criteria:

a) Land area (km^2).

b) Human population – total, rural, and urban (and sub-sets of urban in the case of the PUI).

c) Market demand and marketing capacity as a measure of the opportunities for rural people to generate income. Proxies used to assess market infrastructure and the strength of market demand were:

   c-i) Road density (km of roads per square kilometre converted to an assessment using a five point scale where 5 = dense and 1 = sparse) [This served as a proxy for the potential of the supply side to realise the opportunity offered by an existing market demand].

   c-ii) The number of towns with greater than a specified threshold population (or town built up areas of greater than a specified threshold area) per unit area of the PS. [This was a proxy for the relative strength of market demand].

   c-iii) Assessment of the export potential from the PS to major areas of demand outside the PS. The distance (km) from mid-points of a PS to the major cities of each target and neighbouring countries were assessed. [This also was a proxy for the relative strength of market demand].

d) Supply side assessment – land productivity potential for NR-based/related agricultural enterprises. [This was used as a proxy for the capacity of rural people to use the NR base to generate income and employment and as proxy for the potential to meet national food security targets. The 'land' assessment considered crop and forestry production potential and livestock carrying capacity and fish stocks. The present situation on the ground (i.e., present production of crops, livestock, fish and timber and NT products) was taken into account in the assessment of potential. The assessment also included tourism].

e) Poverty status:

   e-i) Average GDP

   e-ii) Literacy rate, %

   e-iii) Harvard scale (% children with weight for height to age)

f) NR management knowledge base – relative national strength of this for achieving change. [The proxies were: number of degree level of national researchers and proportions qualified at BSc, MSc and PhD levels respectively); number of NR research scientists per total population of the PS and number per 1 million human population of the PS; the share of GDP allocated to NR research].

At the time of formulation of these criteria, it had not been ascertained in detail how feasible it was to obtain the needed data, within the parameters of PS definitions, in the time available and in terms of the extent of accessible information sources. In the event some of the sub-criteria could not be accommodated as planned. In some instances, some carefully judged subjective interpretation of available data was necessary. An example of this arises from the fact that national statistics are usually collected and compiled on the basis of administrative units such as districts, regions and states. The boundaries of these units may or may not match the boundary of a PS. Hence, where required, decisions had to be taken on what proportions of these data, e.g., for human population, should be assigned to a PS.

The notes that support the data entry in the target country profiles (refer Appendix 1) and the summary notes in Section 5 indicate how problem areas with the data for the criteria were handled. In some instances there was no readily available means to dis-aggregate data to a sub-national level and

so the national level statistics were applied to the PS. This occurred in respect of criterion (e) for poverty status and criterion (f) for the NR knowledge base[6].

In the process of compiling the data for the criteria (a) to (f), it was found that a slightly modified framework was more appropriate for this exercise. Hence the data analyses reported in the Appendices use the following ***standard summary framework**:*

Ref	Characterisation Criteria (for each PS):	Sub-ref	Description of Variables
1	**Land area**	-	Measured in km^2
2	**(Human) Rural Population (except PUI that used urban data)**	-	Number of persons
3	**Market feasibility:**	3a	Road Density (relative scale from 1 [low] to 5 [high])
		3b	Market Demand Assessment (number of large towns [>100,000 population] /1000 km^2 of PS)
4	**Potential:**	4a	Assessment of Export Potential (mid point of PS to major city [km] in the PS or an adjacent area)
		4b	Land Productivity Potential (various data used to assess percent contribution to national production converted to a scale of 1 [0-20%] to 5 [80-100%])
5	**Poverty status (National data):**	5a	Average GDP (USD per annum per capita,1997)
		5b	Literacy Rate % (1997)
		5c	Harvard Scale Data (% children weight/height)
6	**NR Knowledge Base (National data):**	6a	% of GDP to Agric Research (1991)
		6b	NR. Res Scientists (1991) per population of PS
		6c	NR Res Scientists (1991) per 1m population of PS

3.2 MAPPING THE PRODUCTION SYSTEM(S) BY TARGET COUNTRY

As is evident from the descriptions of each production system in Section 2, no specific parameters were defined for each system. However, a key criterion for the characterisation exercise was to determine the number of people living in a particular PS and, in order to do this, the boundaries of each PS had to be defined.

Before deciding on the parameters that NRSP would apply, a literature survey showed that different organisations were using different definitions to set the boundaries of a PS. Also it became evident that it was not feasible to apply a single definition for a particular PS across all the target countries concerned. Some examples of variations in definitions and the non-feasibility of applying one definition for a particular PS are given below. Further details on parameters are provided in the target country PS profiles in Section 5. The key point is that the boundaries set for a specific PS were decided on a country by country basis taking account of both the definitions applied by others (principally DFID and relevant national and international organisations) and the past and current locations of NRSP's research for a particular PS in a specific target country. Linked with this, detailed notes were kept as a record of the decision-making processes that determined the choice of PS boundaries and definitions and were the means for filling in items of missing data. Where a decision

[6] / Given time, it would be possible to obtain estimates of criterion (f) for a PS through detailed follow up with appropriate organisations at a national level. However, such detailed follow up was beyond the scope of the Study.

had to be based on largely subjective criteria, this is noted in the country profile concerned (refer Section 5).

Examples of issues in deciding PS boundaries are:

a) ***Contrasting situations for the high potential PS.*** The HP PS concerns rainfed and irrigated farming. For HP-rainfed (in Kenya), a combination of certain soil types and high annual rainfall defined the HP PS boundaries. For HP-irrigated (in India and Bangladesh), elevation and the limits of major river catchments were the main considerations combined with the exclusion of known areas of problem soils and non-agricultural land use.

b) ***Delineating a semi-arid zone.*** The donor (DFID) used a relatively wide definition, encompassing lands where the mean monthly temperature is above 18^0C and annual rainfall in the range 400-1200 mm (ODA, 1994). Other organisations used definitions based on water balance models where, under rainfed conditions in the warm and cool tropics, a length of growing period (LGP) of 75 (or 90)-120 days or an LGP of 75 (or 90)-180 days were defined as semi-arid (e.g., FAO, 1983; CGIAR, 2000). NRSP variously considered annual rainfall and LGP for defining SA lands.

c) ***Defining the hillsides PS.*** While elevation was used to identify this PS, the altitudinal limits and relief for defining farmed and grazed hillsides varied by target country.

d) ***Defining the FAI.*** The definitions used were diverse. LGP was applied for Ghana; a major catchment and elevation were used in Brazil; the FAI was subsumed in the HS definition in Nepal.

e) ***The diversity of the LWI.*** Definitions used for setting the boundaries of the coastal and inland LWI were highly specific for each target country/region (i.e., Bangladesh, the Caribbean, and Uganda). The country profiles in Section 5 explain the various definitions that were applied.

f) ***Decisions for the PUI.*** Definition of the PUI is highly problematic in that its limits are dependent on how many city regions are included. As NRSP in June 2000 covered the PUI in only two target city regions, one each in Ghana and India respectively, it was decided that the PUI would be defined by taking all larger cities (with a lower limit of 100,000 persons population) in Ghana and a sample of eight cities (from small to mega-size) in India. The rationale for this decision was that it defined a larger candidate area (i.e., number of cities) for the uptake and use of the findings of NRSP's PUI research in each target country.

For some target countries, it was judged worthwhile to characterise a PS using more than one definition of its parameters e.g., for SA in Tanzania (see Section 5.13, Maps 24 and 25) and HP in India (see section 5.8, Map 12).

The physiographic characterisation work for criterion (1) was carried out at HTS Development Ltd with technical support provided by the Spatial Information Systems section. The database and document searches that compiled the data and supporting information for criteria (2) to (6) were carried out at the University of East Anglia.

3.3 COMPILING AND COMBINING DATA BY PRODUCTION SYSTEM ACROSS TARGET COUNTRIES

Data for the criteria of the Production Systems Characterisation Study are contained in Appendix 1.

The workbook of the PS data for each characterisation criterion and the data from which these were derived (with supporting notes), are provided for each target country, in alphabetical order (pages App-5 to App-16). Because of particularly complicated situations for dis-aggregating data for Nepal, India and Bangladesh, data supplements illustrating how population and commodity data were derived are also provided (pages App-17 to App-21). The Master Summary Sheet of the combined data for each criterion by production system, with two working definitions of HP, two of SA, two of the FAI, and three of LWI is provided on page App-4.

The data were combined for each individual PS across the target countries concerned to generate totals, or means, or weighted means, as appropriate for the data of each specific criterion. Further details for each criterion are shown in the left hand data description column of the PS Master Summary Sheet (see Appendix 1, page App-4).

In cases where more than one definition of a PS within a target country was examined, combined data for the PS across the target countries were produced for more than one of the possible ways of generating the combined data for a PS. The PSs requiring this treatment were: HP (because two working definitions of HP in India were examined); SA (because two working definitions of SA in India and Tanzania respectively were examined); the FAI (because two working definitions of the FAI in Ghana were examined), and the LWI (because three working definitions for the PS as a whole were examined). Further details of the procedure that was followed are provided in the notes for Appendix 1 (see page App-2).

3.4 COMPARISONS OF DATA FOR CHARACTERISATION CRITERIA BETWEEN PRODUCTION SYSTEMS

Because multiple definitions were considered for four of the PSs, three data sets (versions) for comparisons of the PS data for the characterisation criteria were compiled from the PS Master Summary Sheet (see pages App-22 to App-24). Two scoring methods were used to compare the characterisation data across the six PSs, named as the simple and relative scoring methods.

Simple scoring (Appendix 2). For each version of the PS comparisons, the data for each individual characterisation criterion were ranked across PSs using a simple scoring scale of 1 to 6, as a comparative measure of least to greatest need (also see the notes for Appendix 2, page App-3). In the tables on pages App-22 to App-24, the rank score is shown in each PS by Criterion cell as a bold figure in the left hand side of the cell.

The tables in Appendix 2, pages App-25 to App-27, advance the analysis of the simple rank scores by applying weights to the six characterisation criteria. The weights were assigned by apportioning a total of 10 points across the criteria. Five criteria weighting scenarios are considered. In all scenarios, the weight given to the PS land area purposely was kept to the small value of 0.1. This was because, although the land area of a PS had to be defined in order to determine the number of people contained in that PS, land area *per se* was not considered to be an important criterion in the context of the donor's policy priority. This consideration was especially relevant to the peri-urban interface for which a concept that the PS concerns a defined area of land is least applicable.

In contrast, the weighting assigned to human population was high in all scenarios (a value of 3.9) reflecting the donor's emphasis on achieving an impact on people. Weights assigned to the other four criteria in the five scenarios variously changed the emphasis from, for example, greatest attention to poverty (with a value of 3 relative to 1 for the other three) to equal emphasis on all four (a value of 1.5 for each). The final steps of the analysis were to multiply each simple rank score value by the relevant criterion weight and then sum the weighted rank scores for the six characterisation criteria for each PS. The total weighted scores of each scenario by each PS [see Appendices notes, page App-3]) are shown in the lower part of the tables on pages App-25 to App-27.

In the final table of Appendix 1 (page App-28), the total weighted scores of the three PS versions by the five scenarios (from App-25 to App-27) are displayed and an overall assessment of the findings is presented by (a) generating grand means for all weighting scenarios and all PS versions and (b) generating the means across all PS versions for Scenario 4 (the scenario with greater weights for people and poverty). The implications of the values in (a) and (b) for relative priorities between PSs and possible proportional fund allocation are also presented.

Relative scoring (Appendix 3). Appendix 3 uses the same three data sets as Appendix 2, but ranks the criterion data by a relative score where the value for the PS with the greatest need is assigned a value of 1. All other values are expressed as a fraction (less than 1) of that value (see Appendix 3, App-29 to App-31). This relative method better accommodates comparisons between PSs of criterion data

where values may be both relatively close or relatively distant (whereas the numerical differentiation of simple scoring implied a more equal distance between the data values).

The relative scores were then analysed and compared in the same way as the simple scoring method (see App-32 to App-34 and App-35 respectively).

Correction for double counting of some populations. In both the simple and relative scoring, the population in some target countries was double counted because the country covered two PSs with overlapping areas. This situation applied to Bangladesh (for HP and LW) and Nepal (for HS and FA). Therefore the three datasets were revised to correct for this double counting (see Appendix 4, App-36 to App-38). Using the relative scoring method, the data sets were then re-analysed and compared (see Appendix 4, App-36 to App-38; App-39 to App-41 and App-42 respectively).

3.5 RESOURCE MATERIALS

Information sources used for characterising the production system(s) were:

- World Map in ArcView
- USGS Digital Chart of the World (on the internet)
- FAO databases available in reports and digitally
- Aeronautical charts held in HTS Development Ltd archives
- World Bank documents
- CGIAR documents
- Personal communications with personnel at relevant research institutions

Further details are provided in Section 6 and in the supporting information provided in the country profile work sheets (Appendix 1, pages App-4 to App-21).

4 RESEARCH FINDINGS

4.1 OVERALL DATA ANALYSIS AND MAIN CONCLUSIONS

4.1.1 Data Analysis

Table 4.1 and Figure 4.1 summarise the Study's results with respect to ranking and assessing relative priorities between the six production systems. Both are derived from the values and rankings (by PS, dataset version and criterion weighting scenario) of the weighted scores that are presented in the final summary tables of each scoring method (see App-28, App-35 and App-42). The table and the figure present three prioritisation assessments (A, B and C) which are further described below. All assessments follow the same analytical procedure (as described for Assessment A below) but they examine different selections of the weighted score values, as follows:

Assessment A. This assessment considers all the weighted score data. For each scoring method, the PS means for the weighted scores (calculated across the three dataset versions and five weighting scenarios) are prioritised using two procedures: simple ranking on a scale from 6 to 1, where '6' identifies the largest mean value and is assigned the highest priority and '1' identifies the smallest mean value and is assigned the lowest priority (Table 4.1, Section A1); and proportional (percent) ranking using the sum of the mean weighted scores across PSs for each scoring method as the denominator for the calculation (Table 4.1, Section A2).

The summary tables in the appendices for each scoring method (see App-28, App-35 and App-42) rank each set of the six PS weighted score values on a scale from 6 to 1 (as described above). Figure 4.1A presents the frequency counts of these rankings across all scoring methods (n = 45 [3 scoring methods by 3 dataset versions by 5 weighting scenarios]).

Assessment B. This assessment considers only the weighted score values obtained for the Version 3 dataset (n = 15 [3 scoring methods by 1 dataset version by 5 weighting scenarios]). Except for the LWI (see Section 4.2.4), the Version 3 dataset uses PS definitions that are most closely aligned with the present geographical coverage, within the target countries, of NRSP's past and on-going projects. For this reason, it is singled out for examination on its own (see Table 4.1, Section B and Figure 4.1B).

Assessment C. This assessment singles out Scenario 4 of the weighting scenarios because this scenario gave greater weighting to the poverty status criterion (n = 9 [3 scoring methods by 3 datasets by 1 weighting scenario]). This weighting (3 out of the 10 weighting points), combined with the larger weighting given to people (3.9 out of the 10 points), arguably is the best aligned of the five scenarios considered with the donors policy priorities (see Table 4.1, Section C and Figure 4.1C).

4.1.2 Main Conclusions

Overall ranking of PSs. The simple rankings (see Table 1, Sections A1, B1, C1 and D) identify the semi-arid (SA) PS followed by the high potential (HP) PS as highest priority indicating, on the basis of the method used in this Study, that these PSs have the greatest need. Similarly, the peri-urban interface (PUI) most commonly is identified as having the lowest priority (and therefore least need). After the SA and HP PSs, the ranking of the other PSs most commonly follows the sequence forest agriculture interface (FAI), land water interface (LWI) and hillsides (HS). This same ranking is evident when frequencies of ranking on the 1-6 scale are considered (see Table 1, Section D and Figure 4.1), but with evidence of the LWI rising to higher priority than the FAI in Weighting Scenario 4 (poverty emphasis) (Fig 4.1C).

Table 4.1 Summary of overall findings, derived from the summary tables in Appendices 2 to 4 (see App-28; App-35; and App-42)

Basis of comparisons	HP	HS	SA	FA	LW	PU
A. All results (3 dataset versions by 5 weighting scenarios by each scoring method):						
A1. Simple Overall Ranking (6 = greatest need; 1 = least need)						
Simple scoring method	5	1	6	3	4	2
Relative scoring method	5	2	6	4	3	1
Relative scoring method adjusted for population double counting	5	3	6	4	2	1
A2. Proportional Overall Ranking (percent)						
Simple scoring method	19	12	23	16	16	14
Relative scoring method	19	13	27	17	14	10
Relative scoring method adjusted for population double counting	19	14	28	16	13	10
B. Version 3 dataset only (by 5 weighting scenarios by each scoring method):						
B1. Simple Overall Ranking (6 = greatest need; 1 = least need):						
Simple scoring method	5	1	6	3	4	2
Relative scoring method	5	2	6	4	3	1
Relative scoring method adjusted for population double counting	5	2	6	4	3	1
B2. Proportional Overall Ranking (percent)						
Simple scoring method	19	11	23	16	17	14
Relative scoring method	20	13	26	17	15	9
Relative scoring method adjusted for population double counting	19	13	27	17	14	10
C. Criterion Weighting Scenario 4 only (by 3 dataset versions by each scoring method):						
C1. Simple Overall Ranking (6 = greatest need; 1 = least need):						
Simple scoring method	5	1	6	2	4	3
Relative scoring method	5	2	6	3	4	1
Relative scoring method adjusted for population double counting	5	2	6	3	4	1
C2. Proportional Overall Ranking (percent):						
Simple scoring method	20	12	22	14	17	14
Relative scoring method	20	13	25	15	16	11
Relative scoring method adjusted for population double counting	20	13	26	15	15	11
D. Grand means, modes and ranges across all scoring methods, dataset versions and weighting scenarios:						
Mean of simple ranking values	5.0	2.0	6.0	3.7	3.0	1.4
Mode of simple ranking values	5	2	6	4	3	1
Lowest and highest simple rank	5 to 5	1 to 3	6 to 6	2 to 4	2 to 4	1 to 3
Mean proportional ranking (percent)	19.3	13.1	25.7	16.3	14.5	11.1
Highest proportional rank (percent)	19.9	14.0	28.1	17.0	16.7	14.2
Lowest proportional rank (percent)	18.7	11.6	22.6	15.1	13.1	9.4
Proportional ranking relative to SA	0.75	0.51	1.00	0.63	0.57	0.43

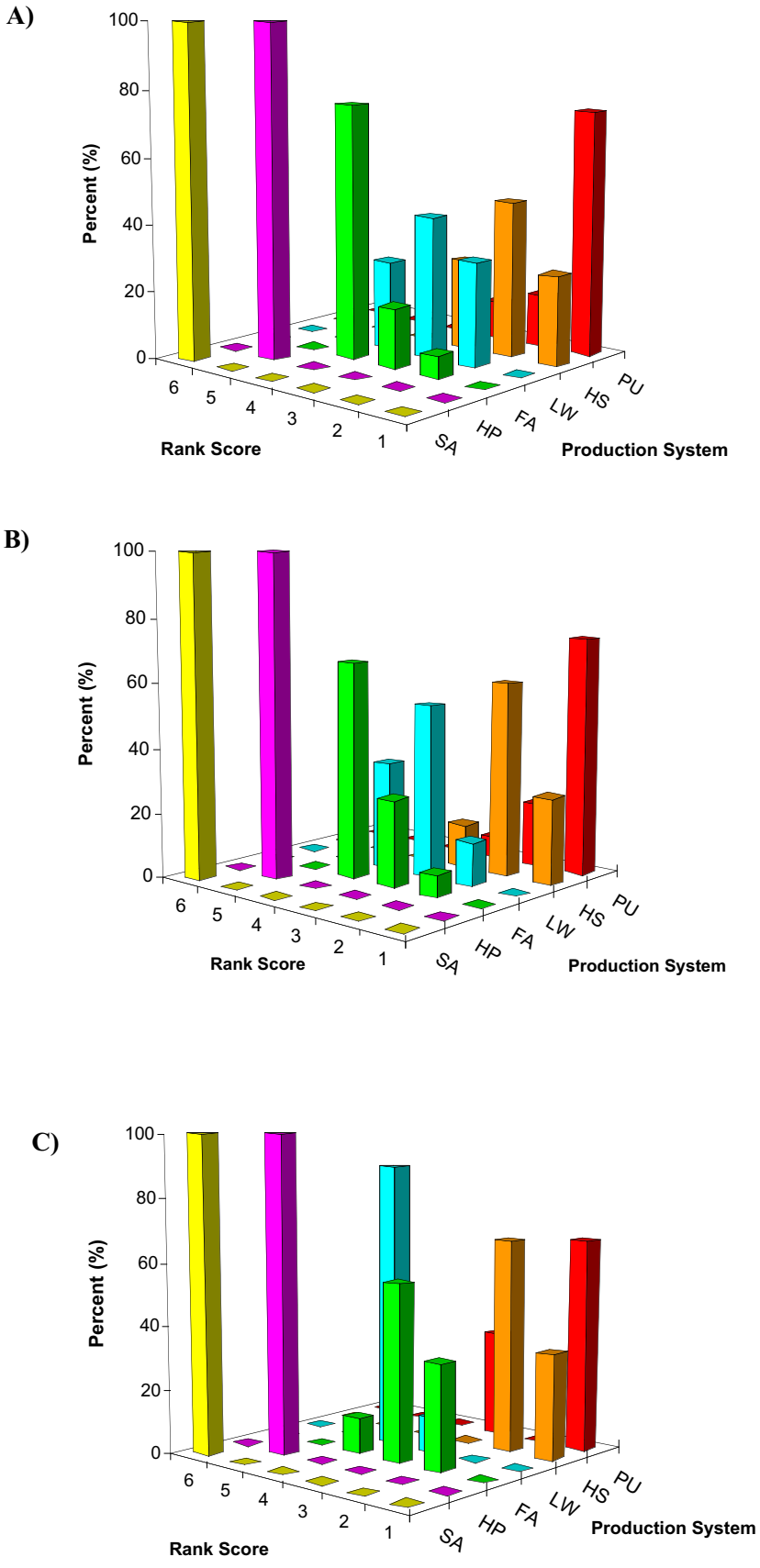


Fig 1: Frequency (%) of Rank Scores from 6 (greatest priority) to 1 (least priority) by Production System for A) All Dataset Versions; B) Dataset Version 3; and C) Criterion Weighting Secenario 4

Relative priorities between PSs. The relative proportional rankings (Table 4.1, Sections A2, B2, C2 and D) confirm the results of the simple ranking. The relative mean proportions for SA (27%) followed by the HP (19%) emphasise the importance (greatest need) of these PSs. FA follows (17%) and then LW and HS with similar relative mean proportions (LW – 14%; HS – 13%). PU has the lowest proportional ranking (10%).

Ranking for PS definitions that are well aligned with the geographical scope of NRSP. The PS definitions for the Version 3 dataset most closely match the geographical scope of NRSP in each target country. The sole exception is the definition for LW (coded LW(3)) which takes only the LWI of one target country (Bangladesh) but excludes the second target 'country', the Caribbean and the possible third target country, Uganda (also see Section 4.2.4).

As shown in Table 4.1 – Section B, the PS rankings are the same as those found in the overall analysis but in this analysis, after SA and HP as the high priority pair, FA and LW form a close mid-rank pair while HS and PU for a close low rank pair (also see Fig 4.1B where the most frequent simple ranking shows this same pairing).

Because the Version 3 dataset most closely represents the geographic scope of NRSP (as from April 1999), it is relevant to compare the prioritisation of the proportional PS rankings with the budget allocations planned for NRSP in the period of the programmes term (1999-2005)[7] (see Table 4.2 below).

Table 4.2 Comparison of the Study's predictions with NRSP's plans, as of late 2000

Comparisons:	Production System					
	HP	**HS**	**SA**	**FA**	**LW**	**PU**
Recommended from the Study:						
Mean across 3 scoring methods and 5 weighting scenarios (n=15)	19	13	26	16	15	11
Mean using the most sensitive scoring method (relative with population double counting adjusted) across 5 weighting scenarios (n=5)	19	14	28	16	13	10
Value for Scenario 4 only with most sensitive scoring method (n=1)	20	13	26	15	15	11
NRSP research funding plans:						
NRSP budget forecast for 1999-2002[8]	16	13	21	20	15	12
NRSP budget plan for 1999-2005	18	13	20	19	19	15

The comparisons in Table 4.2 show that NRSP's relative funding plans for the PSs reflect the recommendations of the Study, but could consider greater allocations to SA, less to FA, and possibly also less to LW and PU. As was stated in the introduction, a complex of factors influence funding allocations within a research programme. Similarly, the Study's findings were not intended to impose a straitjacket on NRSP's decision-making for research fund management. Nevertheless, the comparison has made evident that SA, as the highest priority PS, should be considered for a greater fund allocation.

PS ranking for Weighting Scenario 4 (greater weighting to Criterion 5 – poverty status; Table 4.1,Section C). The PS rankings for Scenario 4 are similar to those reported above, but the proportional rankings for the FAI and LWI are close with LW results indicating slightly higher

[7] / This period corresponds to the time from which NRSP effectively refocused its research to take account of the DFID-RNRRS response to the UK Government's 1997 White Paper through to the planned end date of the programme.

[8] / As of 2000, the assured budget period for NRSP was the three year period, April 1999 to March 2002.

priority than FA when poverty status is emphasised (also see Fig 4.1C). This result arises from the higher ranking of LW relative to FA for Criterion 5 (i.e., a greater need for poverty reduction in LW relative to FA) which is further amplified through the greater weighting given to poverty status in Scenario 4.

Concluding remarks. The analyses showed a high level of consistency in the order of prioritisation of the production systems between the various PS definitions (handled as three different PS characterisation datasets), methods of scoring (simple versus relative) and calculation (allocation of weightings for the characterisation criteria). All analyses identify SA and HP as having the greatest need while HS and PU have least need but with PU more commonly having the lower need in this pair. The FAI and LWI are consistently in the middle ranking. Relative to this finding, the scale of NRSP's planned funding is aligned with this priority ranking although the level for SA could be raised with corresponding reductions in the levels for the FAI and the PUI, and possibly the LWI.

4.2 OTHER FINDINGS OF THE CHARACTERISATION STUDY

4.2.1 General Comment

This Study focused on developing a sounder basis for priority setting between production systems, in the context of the donor's policy priorities. In order to do this, profiles were developed of each PS within the relevant target countries. This exercise required decisions on how to define specific PSs and brought forward some of the limitations for their characterisation e.g., difficulties in disaggregating national data to match PS boundaries. The whole characterisation exercise improved the descriptive documentation of the six PSs of DFID's RNRRS and raised NRSP's awareness of similarities and contrasts within each PS that relate to the chosen target countries. The following sections highlight these aspects of the findings of the characterisation work including the effects on the analysis of priorities between PSs.

4.2.2 Best Judgements on PS boundaries

Section 3.2 summarised the decisions that were taken to define a PS in each target country assigned to that PS. Some further details and comments on PS definition are given below.

Semi-arid PS. Out of the six PSs, the SA is the only one for which a definition could be well grounded in published agro-climatological literature (e.g., a definition based only on length of growing period, LGP). However, even for this PS it was found that it was preferable to vary the definitions between the target countries, to best reflect the geographical emphasis and coverage within each target country. Thus, for India and Zimbabwe, the definition judged to be most appropriate was lands with an LGP of 3-5 months (see Section 5, Maps 14 and 31 respectively and datasets Versions 1 and 3, page App-2) while for Tanzania a definition of lands with an annual rainfall of 300-900 mm was preferred (see Section 5, Map 24 and dataset Versions 1 and 3, page App-2).

High potential PS. For defining HP lands, the contrast of rainfed and irrigated farming was a major consideration. Thus the rainfed HP lands in Kenya were defined on the basis of the incidence of certain relatively fertile well structured soils (see Section 5, Map 21), an annual rainfall greater than 900 mm (Map 19) and LGP greater than 7 months (Map 20). In contrast, in India the HP lands were defined by using elevation to demarcate part of the major river catchment forming the irrigated lands of Indo-Gangetic Plains. The definition using lands below 150 m elevation was preferred (Maps 12 and 13 and dataset Versions 1 and 3, page App-2). In Bangladesh, it was judged that HP lands cannot be separated from the inland floodplain area that defines this target ecosystem of the LWI and therefore each PS covers the same land area (see Section 5, Maps 1 and 2 respectively). The distinction between HP and LWI in the inland floodplain of Bangladesh rests on the research aims of their respective projects with HP emphasising the land component, especially the management of farm lands.

Hillsides PS. Elevation was used to define the HS PS in all three target countries but the altitudinal limits were distinct for each target country (see Section 5, Map 4 – Bolivia, elevation 1000-3500 m; Map 22 – Nepal, 300-2500 m; Map 26 – Uganda, elevation 1500-2000 m).

Forest agriculture interface. Definition of the FAI was specific to each target country. For Ghana, LGP was used. The definition that covered lands with an LGP of 9-10 months was preferred (see Section 5, Map 9 and dataset Versions 2 and 3, page, App-2). This covers, in large part, the lands of the natural forest-savannah transition belt and more southerly lands that can support a forest climax vegetation but are also disturbed by human settlement and forest clearance. For Brazil, the lowland corridor (elevation below 100 m) of the Amazon river and its delta was taken to define the area of forest climax vegetation that is undergoing clearance and conversion to agricultural use (Maps 5 and 6). In Nepal, in a similar way to HP and LWI in Bangladesh, the FAI was judged to address certain forest and farm management situations within the land area defined for the HS PS. Thus the FAI and HS have the same definition in Nepal (Map 22).

These overlays of defined lands areas for more than one PS was the reason for applying the third scoring method where double counting of population of these areas was adjusted by the arbitrary allocation of half of the population of the defined land areas to the each of the PSs concerned.

Land water interface. As explained in Section 2.2.6, the LWI covers two ecosystems, coastal zones and floodplains, and, although the aquatic environment has priority for the coastal zone, a wider approach is taken to production constraints to consider the effects of land use practices and topography on coastal ecosystems. At the time of the characterisation study, the LWI had one target region, the Caribbean (see Section 5, Map 7) and one target country, Bangladesh (Map 2), respectively, for each target ecosystem, with Uganda (Map 29) under consideration as a second country for the floodplain ecosystem. For defining the LWI in the Caribbean, decisions had to be taken on which islands and which parts of the Americas' mainland to include. The decision on what to include was based on the regional scope of DFID's support programme and, in conformity with NRSP's conceptual approach to the LWI, the total area of islands and 20% of the mainland state of Guyana were included. In Bangladesh, based on FAO's agroecological study (FAO, 1998), a coastal zone was defined in addition to the inland floodplain, and this was included in the LWI coastal zone definition (see Map 2).

Peri-urban interface. From the outset it was recognised that the PUI would be problematical (and disadvantaged) in this Study mainly because there were no strong arguments for the number of cities/towns that should be included in the definition. At the time of the Study, and for historical reasons (see Section 2.2.7), the PUI portfolio contained only two target city regions, Kumasi (Ghana) and Hubli-Dharwad (India). It was recognised that more cities/towns should be added and decisions were taken on this, adding all major cities and towns in Ghana and a selection of cities in India (for details see Sections 5.7 and 5.10 and Maps 11 and 17). While this was judged as a reasonable decision, in that it anticipated an achievable level of scaling-up of the PUI research, the limits were set subjectively. From the outset it was agreed that to define a land area for the PUI arguably was a misconception and anyway was not feasible for this Study. Linked with this, the PS land area criterion was de-emphasised in the weights applied for comparing between PSs (also see Section 3.4). The possible size of the peri-urban population was assessed by examining the difference in metropolitan and city area population statistics (details are given in Sections 5.7 and 5.10).

4.2.3 Effects of Target Countries on PS Prioritisation

An important aspect of the method used to compare PSs is that it depended on relative rankings rather than differences in absolute values for each defined criterion. Nevertheless, large differences in some of the target country data that contributed to the characterisation criteria for a specific PS (see Section 3.1) were an important aspect of the priority ranking that was determined between the six PSs.

This was especially relevant to the rural/peri-urban population criterion. Both the HP and SA PSs include countries with large rural populations (India for SA, and India and Bangladesh for HP). This gave these PSs high relative ranks for the population criterion. When combined with the high weighting given to people (39% in all weighting scenarios), this carried these PSs through to their highest relative rank for this characterisation criterion, and their high PS ranking overall (as reported in Section 4.1).

Of course, the effects of large populations could have been altered by changing the weighting points given to the population criterion. However, the weightings were assigned to reflect the donor's policy priorities and, in this respect, the outcome reflects developmental need expressed through numbers of people.

As shown in Section 4.1, the FAI held third priority ranking after SA and HP. Unlike HP and SA, this PS does not have a distinctly large population and in the analysis of datasets Versions 1-3 it variously had the lowest or second lowest weighted score for Criterion No. 2 – rural population. However, for some of the other characterisation criteria, FA had higher rankings and hence in the overall analysis it was ranked third priority following SA and HP and above LW, HS and PUI. Thus, the method followed enabled differentiation between the four PSs with smaller and more comparable populations.

As reported above (Section 4.1.2), there was one instance (Scenario 4 – greater weighting to poverty) where LWI was ahead of FA in the middle rankings (this is well illustrated in Fig 4.1C). Both PSs include target countries with acute poverty problems (Nepal for FA and Bangladesh for LW) and less acute problems (Brazil for FA and the Caribbean for LW). However, because weighted means were generated for the three descriptors of the poverty status criterion (Criterion 5), the higher population of Bangladesh (in LW) relative to that of Nepal (in FA) gave rise to lower values for the descriptors and in turn higher rankings for the poverty reduction need for LW. When linked with the weighting for poverty in Scenario 4, this placed the relative priority of LW slightly above that of the FA.

In sum, therefore, whilst the method for PS comparison purposely used relative rankings based on simple or relative scores, the target countries specified for a PS, particularly the size of their national populations, were a key factor in the prioritisation that was determined between the six PSs. Put another way, human population was an all pervasive aspect of the PS Characterisation Study.

4.2.4 Comparison across PSs – Poverty Status

Use of national statistics for poverty status. Although data from national statistics were available for the three variables that were used to define Criteria No. 5 – poverty status (i.e., average GDP, literacy rate, Harvard Scale data for child nutritional status) it was not possible to fine tune these data to the circumstances of the people within the land area of a PS in each of its target countries. Therefore the national statistics had to be used as the best estimate available for PS poverty status. Weighted means, based on the estimated population of a PS in each target country, were calculated to provide a measure of the scale of the poverty problem of a PS in a defined target country.

As was described above (see Section 4.2.3), this weighted assessment of the poverty status criterion, when combined with the higher weighting that it was given in Scenario 4, raised LW to a slightly higher priority than FA in that scenario. The relatively large population of Bangladesh and low values of the statistics for Criterion 5 explain this shift. (Out of the eleven target countries of this Study, only Nepal had (slightly) lower values than Bangladesh for Criterion 5).

The three PS definitions for the LWI (LW(1)-LW(3)). The large contrasts between the target countries of the LWI in respect of population and poverty status (particularly Bangladesh compared with the Caribbean) were the reason for the three PS definitions that were considered for the LWI. Linked with this, these definitions also addressed some concerns of the donor about the continued inclusion of the Caribbean in NRSP's research portfolio and the possible commencement of NRSP-LW research in the third target country for LW, Uganda (also see Section 2.2.6 and Table 2.1).

LW(1) examined only floodplains (Bangladesh and Uganda) based on the argument that the LW portfolio could take on this emphasis if NRSP's research in the Caribbean was wound down. LW(2) examined the target countries of LW as they were in mid-2000 (Bangladesh and Caribbean) and then LW(3) examined only Bangladesh (floodplains and coastal) (also see App-2). Even though the Version 3 dataset was intended to match most closely the existing and planned geographic scope of NRSP, purposely, in respect of the LWI, LW(3) was included rather than LW(2) in this dataset. The reasoning was that as the donor had queried the geographic scope of this PS, for forward planning purposes, its importance relative to the other PSs, should be assessed with the problematic target region (Caribbean) removed.

As shown in Table 4.1 and Fig 4.1, LW(3) in the Version 3 dataset confirmed the middle ranking of the LWI, following the FAI and the need of Bangladesh for relevant LWI research[9].

4.2.5 Comparison across PSs – Other Criteria

Although Weighting Scenario 4 has been singled out for closer examination in this report (see Section 4.2.4 above and Table 4.1, Section C and Fig 4.1C), the other scenarios could be used if particular arguments on priority setting needed to be addressed e.g., Scenario 2 assesses priorities when the importance of, and problem of need for, good market infrastructure is emphasised while Scenario 3 assesses priorities when the productivity potential of the natural resource based is emphasised.

4.3 COMMENTS ON THE STUDY'S METHOD

The Study's method has proved to be robust in the sense that attention to varying PS definitions and alternative ways of comparing between PSs to assess relative importance has, in the end, not shown significant differences in the conclusions reached. The attention paid to considering different definitions of a PS within a specific target country, the various versions of combining PSs across target countries, and the alternative ways of comparing across PS data using different scoring methods and weighting scenarios did not produce any major changes in findings for PS characteristics and differences and relative priorities between PSs. It is therefore considered that the results have an independent rationality when considered in relation to the countries that are included in each PS.

As has been discussed above (see Section 4.2.3), the target countries (that are specified by DFID) of each PS have a large effect on the needs rankings. Within this, the size of their target populations mainly explains the high priority of the SA and HP with the size of India and its population as a major factor in this. However, importantly, the ranking procedures of the method enabled differentiation of PSs with more comparable populations.

An additional aspect of the method is that it demonstrates a procedure for evaluating the implications of a donor's developmental policy priorities for making strategic decisions on certain aspects of setting research priorities. Key steps were to define characterisation criteria that directly or through proxies reflect a donor's policy and to work with rankings and weightings in order to apply a standard assessment procedure to all the criteria considered.

[9] / With respect to NRSP's research planning, because of the generic relevance of the Caribbean-LW research and the benefits that were arising from research continuity in that region, it was argued and accepted that it was preferable to continue LW research in that region rather than start a new initiative specifically in the Bangladesh coastal zone. This is an example of how a priority setting exercise has to be adjudicated with other considerations regarding research efficiency and best value.

5 PRODUCTION SYSTEMS CHARACTERISATION MAPS

5.1 OVERVIEW

The following section presents the production system maps and supporting information, arranged in the alphabetical order of the target countries. For each target country there is a general description of the main features and parameters that were applied to define the area of a production system. Also, in addition to the production system map(s) for each target country, maps are included to illustrate how the production system area was derived.

Table 5.1 provides details of the production systems maps for each target country. The map reference number is included in the appropriate cell of the matrix.

Table 5.1: Production Systems Characterisation Maps (map numbers are shown in the relevant cell)

	Production Systems					
	–			**Interfaces**		
Countries	High Potential	Hillsides	Semi-Arid	Forest Agriculture	Land Water	Peri-Urban
Bangladesh	**1**				**2**	
Bolivia		**4**				
Brazil				**5**		
Caribbean					**7**	
Ghana				**9**		**11**
India	**12**		**14, 15**			**17**
Kenya	**18**					
Nepal		**22**		**22**		
Tanzania			**24, 25**			
Uganda		**26**			**29, 30**	
Zimbabwe			**31, 32**			

5.2 BANGLADESH

PRODUCTION SYSTEM – HIGH POTENTIAL AND LAND WATER INTERFACE

Based on land area below 100 metres elevation and excluding the Hill Tracts District of Chittagong Region. The target area was divided between the floodplain region and the coastal zone. The coastal zone was taken as the Ganges Tidal Floodplain, which includes the Kulna Sunderbans, and the saline areas of the Young Meghna River Floodplain.

Land Area Area mapped using ArcView, calculated in km_.

Population The UN Economic and Social Commission for Asia and the Pacific quotes a figure of 20% for the proportion of the Bangladeshi population inhabiting the Hill Tracts District of Chittagong Region. Accordingly the population for the target area is 80% of the UN 1998 estimate for Bangladesh.

Road Density Estimated density of roads in target area using GeoCenter World Country Maps: India (North East). Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Seventeen cities with populations greater than 100,000 persons (UN data) per 1000 km_ of target area.

Assessment of Export Potential From any point within the production system, it is estimated that it is a maximum of 100 km to the nearest of any of major cities.

Land Productivity Potential From the Bangladesh Statistical Yearbook (1998 data) it is calculated that the target area contributes to the following percentages to national production for selected key products:

Rice	95%
Wheat	99%
Groundnuts	94%
Livestock	99%
Inland Fisheries	93%
Bananas	96%

A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area was applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data from the *Statistical Yearbook of Bangladesh* and maps from the FAO/GIEWS website. This assessment does not include tourism.

Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

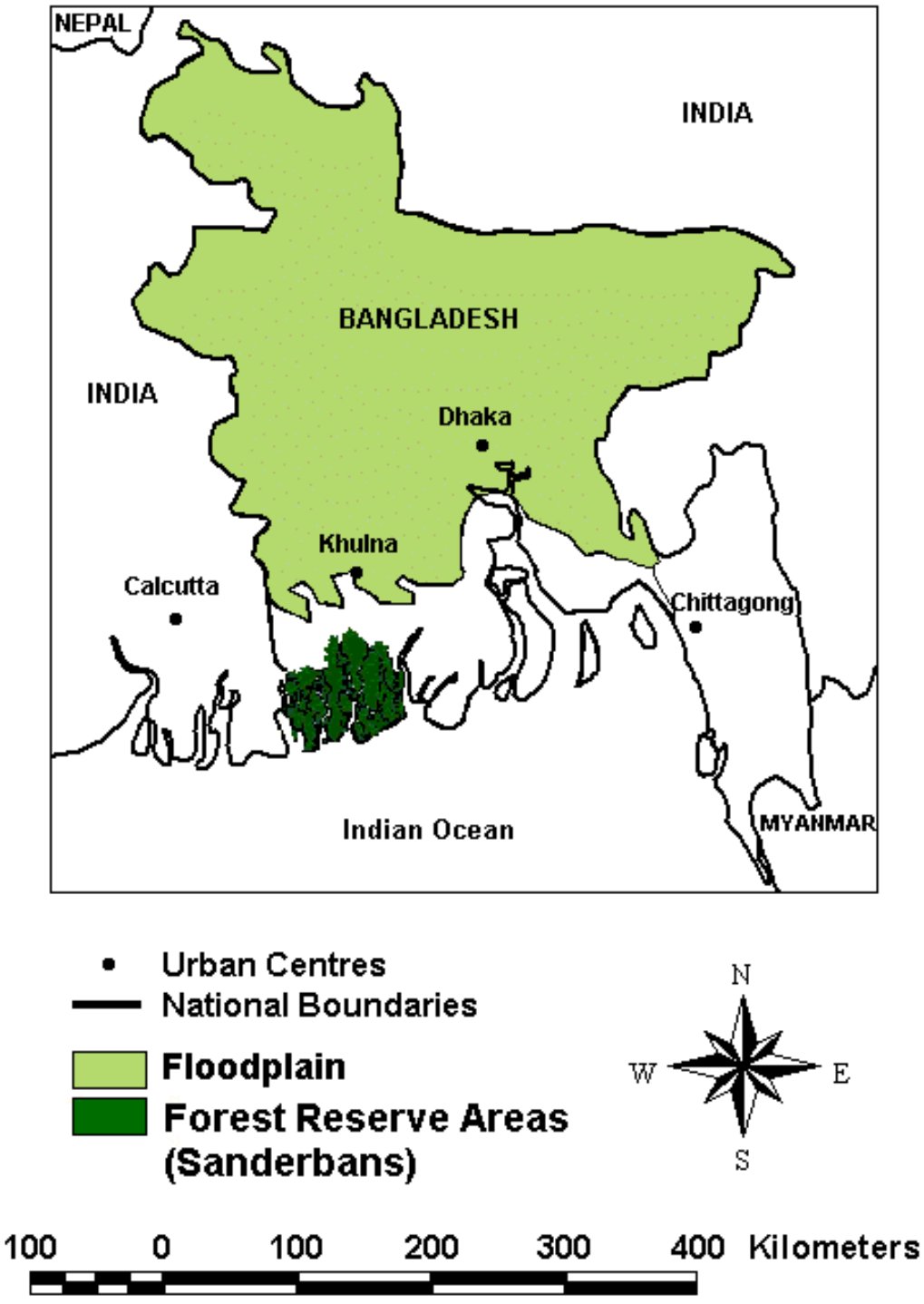
NR Knowledge Base Data for degree level of national researchers not available. Number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Map 1: Bangladesh – High Potential Production System

Production System Area below 100 metres

National Land Area 138,507 km^2

Floodplain System Area 103,827 km^2 Floodplain Population 77,831,315

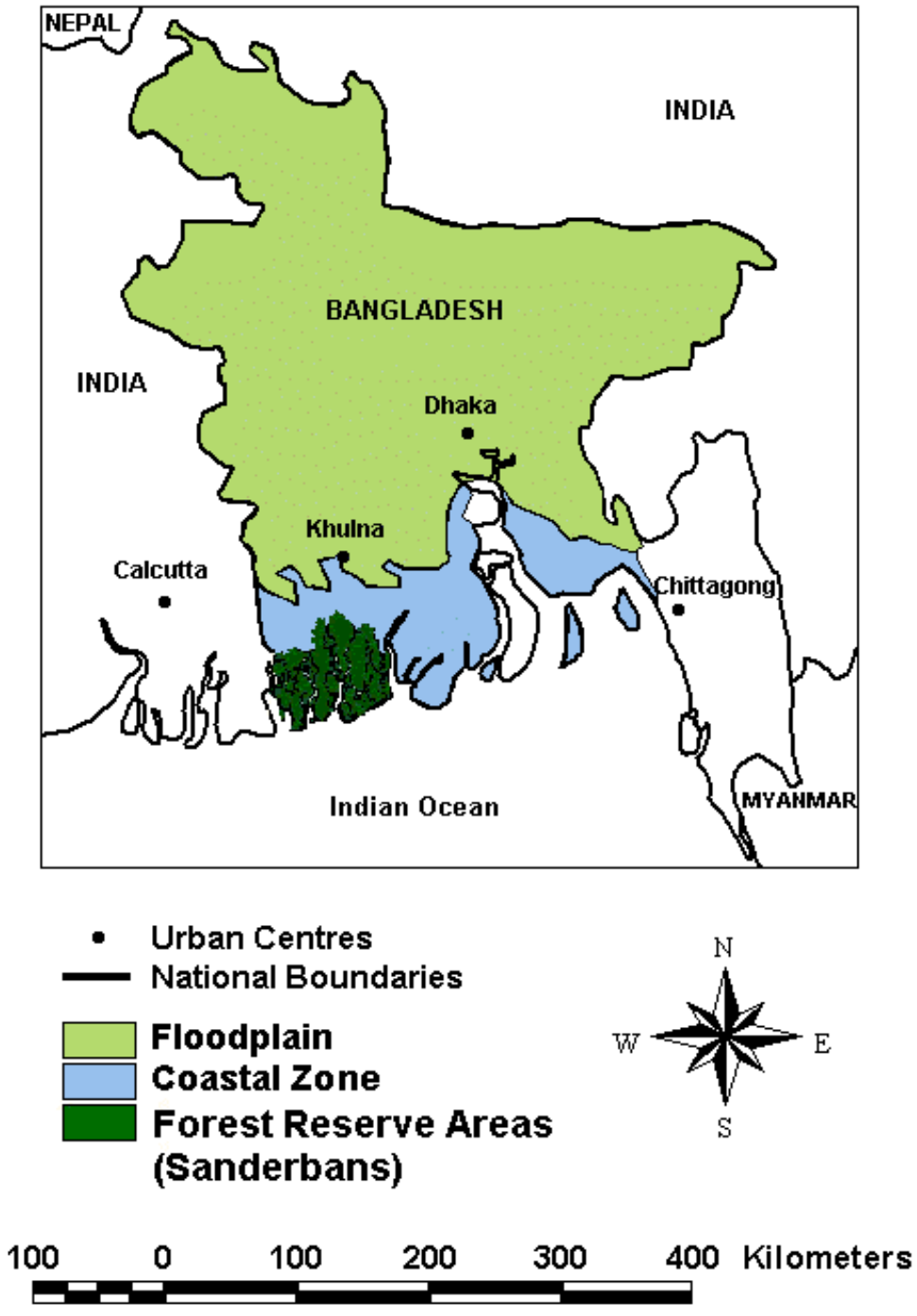


Note: This Map was based on an elevation map of Bangladesh and FAO, 1988

Map 2: Bangladesh – Land Water Interface

Production System Area below 100 metres

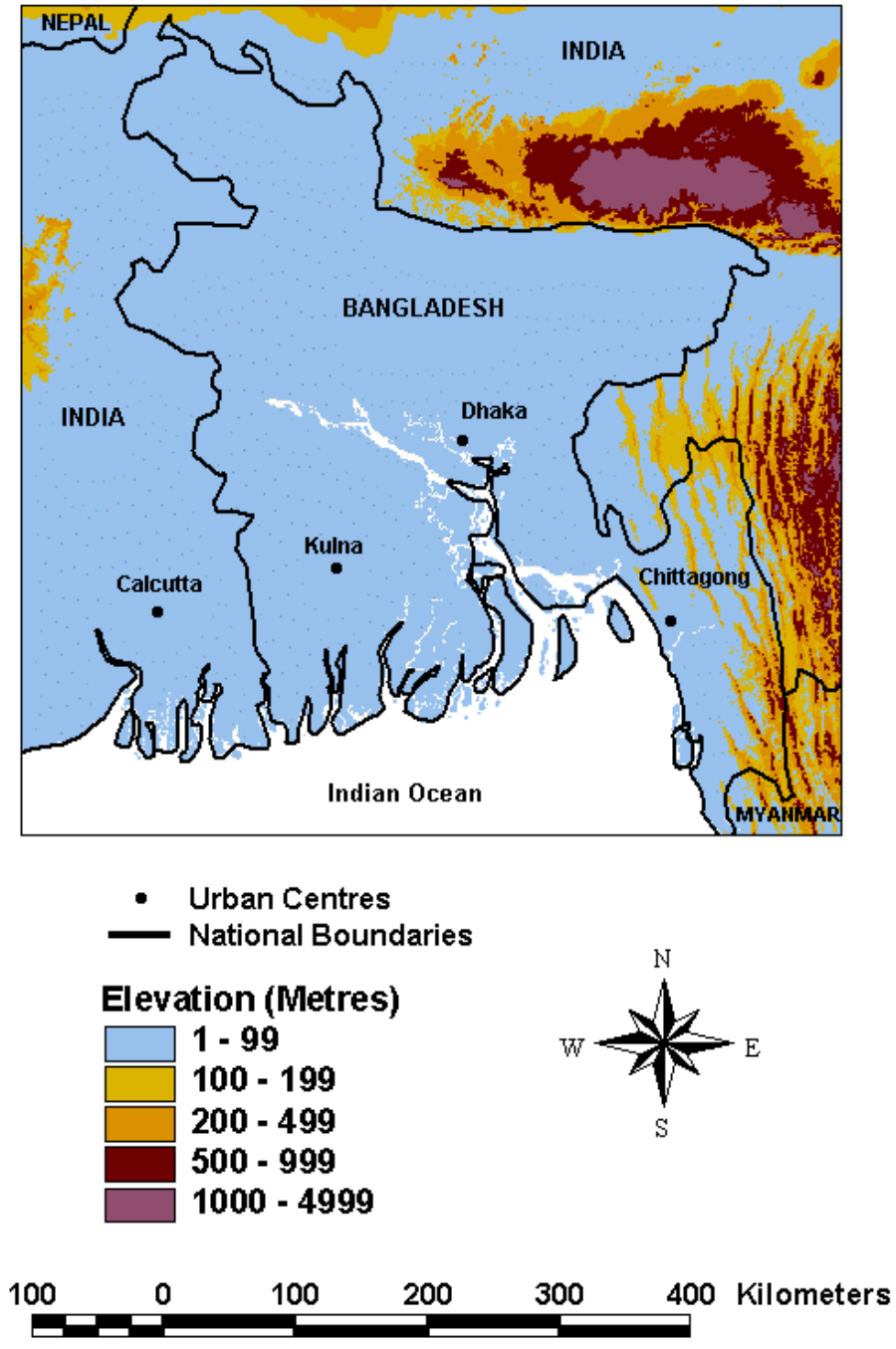
National Land Area	138,507 km^2		
Floodplain Area	103,827 km^2	Coastal Area	20,322 km^2 (incl. Sunderbans)
Floodplain Population	77,831,315	Coastal Population	20,223,885



Note: This Map was based on an elevation map of Bangladesh and FAO, 1988

Map 3: Bangladesh – Elevation Map

National Land Area 138,507 km^2



5.3 BOLIVIA

Production system – Hillsides

Based on lands between elevations of 1000-3500 metres. This zone equates to the Valleys AEZ, which, according to CID data accounts for 19% of the Bolivian land area and 53% of its population. The target area has been divided into two sub-systems (elevations of 1000-2000 m and 2000-3500 m respectively – the subtropical and temperate valleys). It forms a band across the south-west of the country from the Peru border around Lake Titicaca in La Paz province, to the east and north of Potosi provinces. It covers the central and southern Cochabamba province, the western fringes of Santa Cruz province, the western 80% of Chuquisaca province, and the western half of Tarija.

Land Area	Area mapped using ArcView, calculated in km_.
Population	CID data quotes that 53% of the population live in the valleys AEZ. This percentage has been applied to the UN 1998 estimate of 7.95million. The proportion of rural and urban inhabitants as percentages of the total population has also been applied to the UN data.
Road Density	Estimated density of roads in target area using GeoCenter World Country Maps: South America (North). Scale used: 5 = dense, 1 = sparse.
Demand Side Assessment	Number of towns with populations of greater than 100,000 persons per 1000 km_ of target area.
Assessment of Export Potential	Estimated 150 km maximum distance from any point in the target area to a major town. As this is a mountain region, distances will be distorted by the topography and this assessment takes no account of the state of the transport network.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. This assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report* and WHO website.
NR Knowledge Base	Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

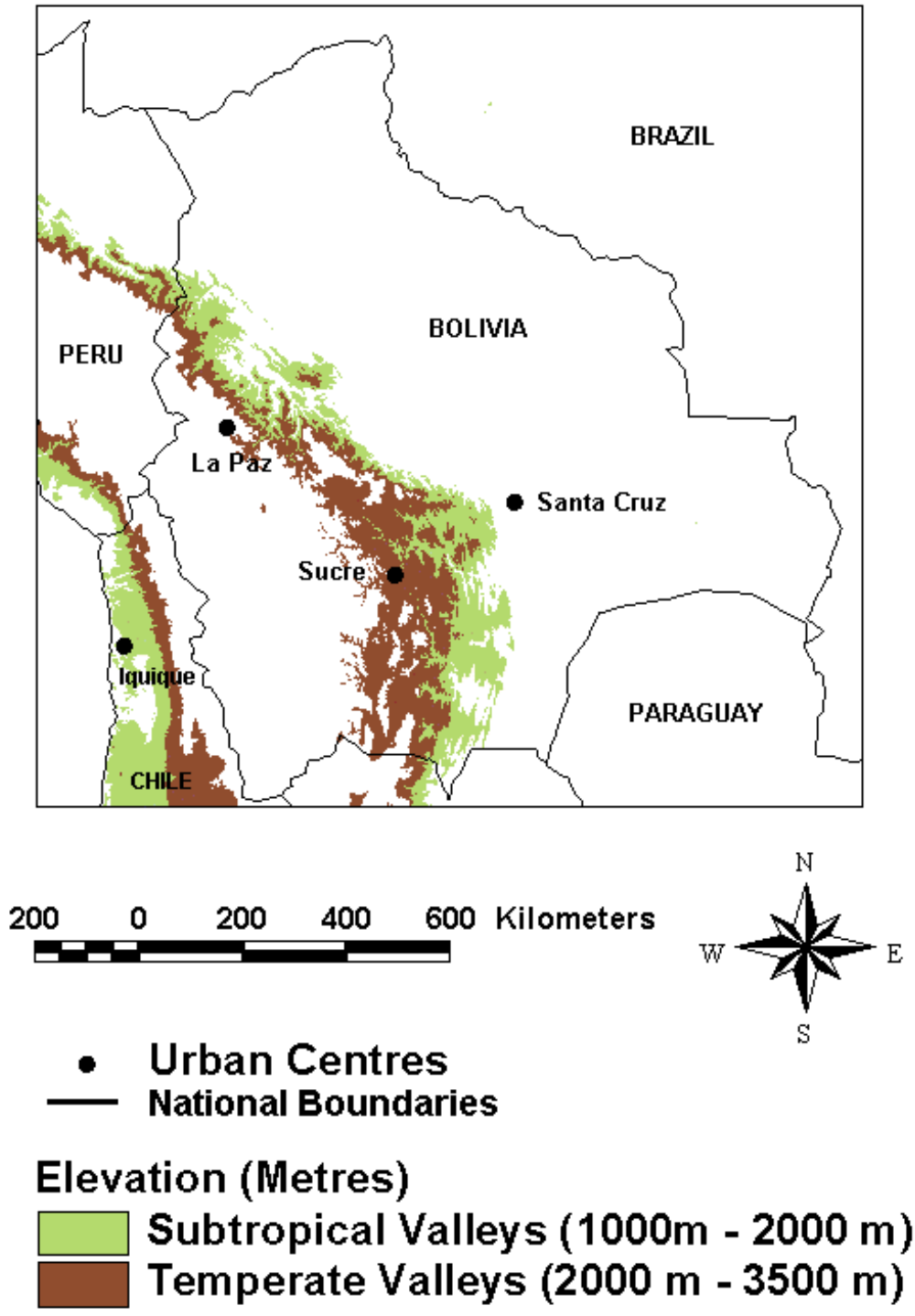
Map 4: Bolivia – Hillsides Production System

Elevation 1000 metres to 3500 metres

National Land Area 1,090,353 km^2

Production System Area 183,585 km^2

Subtropical Valley Area 77,891 km^2 Temperate Valley Area 105,694 km^2



5.4 BRAZIL

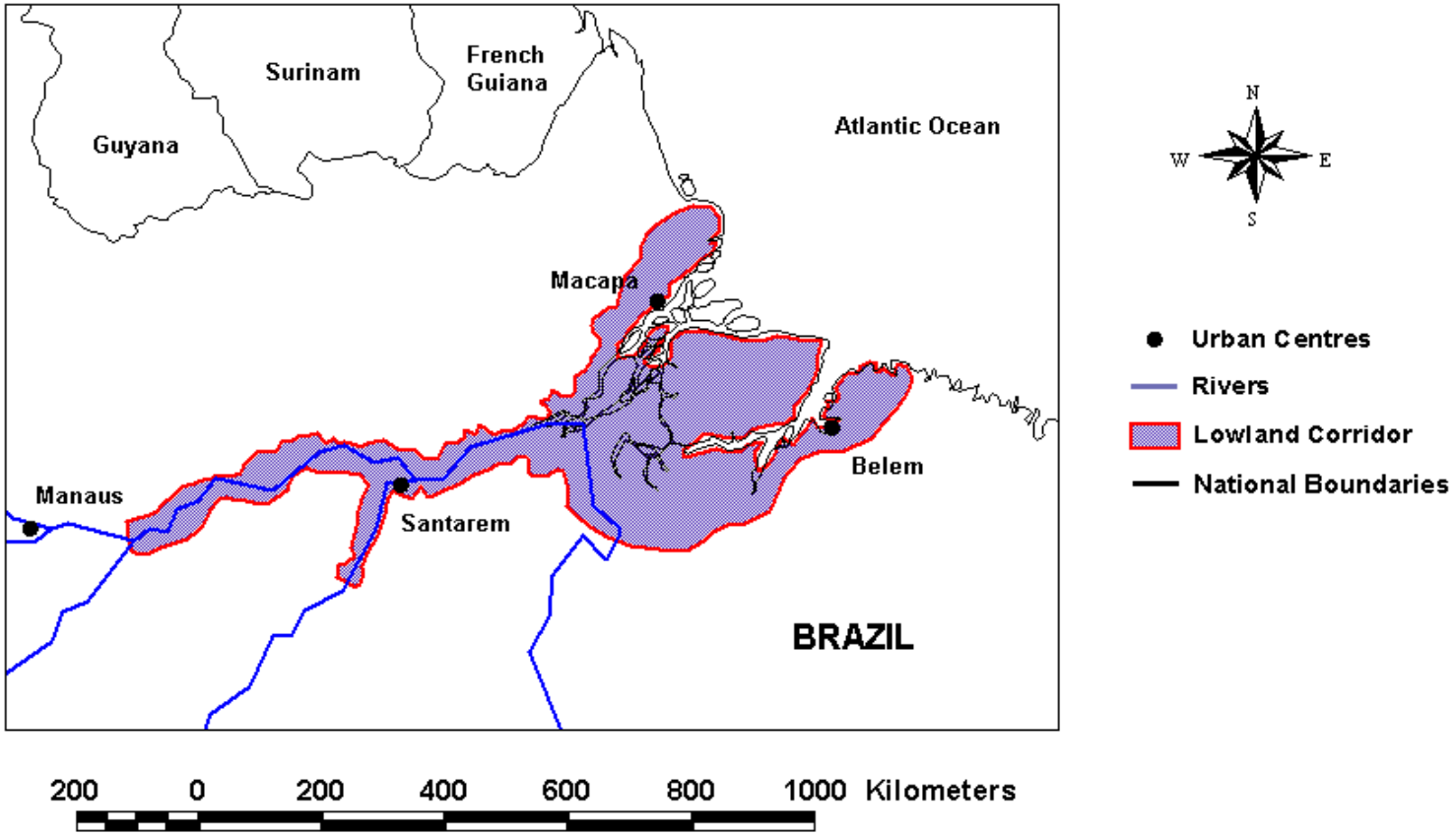
Production system - Forest Agriculture Interface

The lowland corridor along the Amazon river from Manaus to the delta including the areas around Belém and Macapá either side of the delta and the banks of the Rio Tapajos as far as Itaituba in Pará state. Occupies south of Amapa, 70% of Pará and 5% of Amazonas states. Zone of lowland forest clearance, all at elevations below 100 metres.

Land Area	Area mapped using ArcView, calculated in km_.
Population	Calculated using a value of 3 people per km_ for the total target area (based on an average population density taken from the Times World Atlas) plus the UN (1993) data for those cities falling within the zone: Belem, Manaus, Santarem, Itaituba, Altamira and Macapa.
Road Density	Estimated density of roads in target area using GeoCenter World Country Maps: South America (North). Scale used: 5 = dense, 1 = sparse.
Demand Side Assessment	Based on the six towns in the target area with populations greater than 100,000 persons.
Assessment of Export Potential	Estimated maximum of 300 km from any point in target area to a major town. This is a linear measurement only and does not account for transport infrastructure.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. This assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report* and WHO website.
NR Knowledge Base	Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Map 5: Brazil – Forest Agriculture Interface based on the Lowland River Corridor

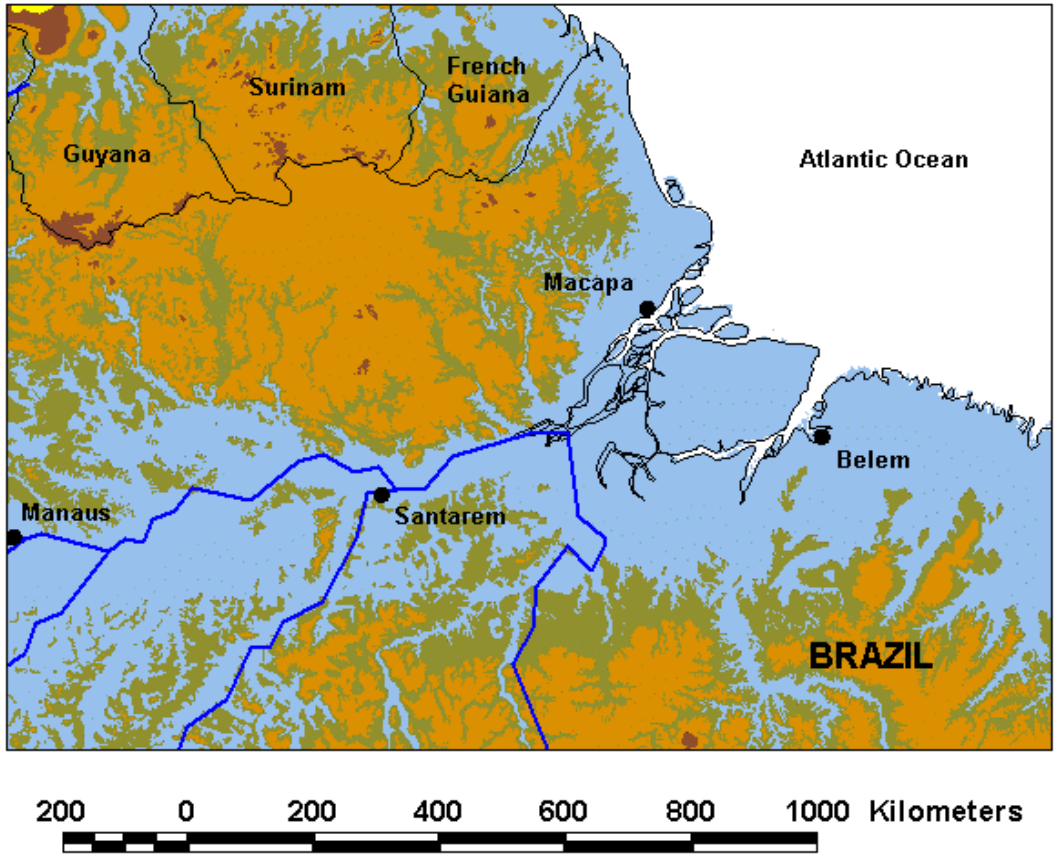
National Land Area 8,507,128 km^2 Production System Area 237,927 km^2



Note: This map was based on an elevation map of Brazil

Map 6: Brazil –Elevation Map (eastern Amazonia)

National Land Area 8,507,128 km^2



5.5 CARIBBEAN

Production system – Land Water Interface

Based on a modified DFID definition of the Caribbean, consisting of the small sovereign island states, Jamaica, UK dependencies and the mainland coastal zone of Guyana. Alternative definitions include all CARICOM countries, which also encompass The Bahamas, Haiti and Surinam. French, Dutch and US dependencies and overseas territories are not included. The definition used here is: Anguilla, Antigua & Barbuda, Barbados, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana (coastal zone), Jamaica, Montserrat, St Kitts & Nevis, St Lucia, St Vincent & the Grenadines, Trinidad & Tobago and the Turks & Caicos Islands.

Land Area	Areas obtained from CIA *World Factbook*. 80% of the area of Guyana was excluded. The relevant data are in Table 5.2.
Population	Calculated using total population data for the countries in the target area (refer to Table 5.3). For Guyana 50% of the total was used. The heavy concentration of population in coastal areas justifies this weighting, however the overall numbers involved are small in comparison to other parts of the world so using other proportions could be considered without affecting the final outcome.
Road Density	Calculated using 1996 estimates from the CIA World Factbook (total kms of paved and unpaved road) for the target countries. The figure includes the total length of roads in Guyana. A value of 5 on the scale 5 = dense, 1 = sparse was applied.
Demand Side Assessment	The only towns with populations greater than 100,000 persons are Kingston, Georgetown and Port of Spain. The result is distorted by the greater land area represented by the mainland.
Assessment of Export Potential	Maximum distance from the target area to a major town relative to the size of the territory under consideration. This varies greatly: from 100 km in Guyana and 50 km in Jamaica to only a few km in the smaller islands. If the size of the towns on the small islands is considered unsuitable for this analysis then the distances will be far greater as larger export destinations represented by cities such as Kingston, Port of Spain or mainland cities outside the target area will enter the equation. This would require an analysis of freight transport infrastructure.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. As the target area occupies the entire national area of the countries under consideration (except Guyana) it has been assumed that the production system contributes all 'national' production. This assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report*, and WHO website. National GDP per capita data and adult literacy data weighted to reflect the relative sizes of populations in the various territories. Jamaica and Trinidad & Tobago tend to dominate. For the weight for height data only figures for Dominica, Granada, Jamaica and Trinidad & Tobago were available. An average for the latter two was taken.

NR Knowledge Base Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research were obtained from ISNAR website for a few countries but the limited data could not produce any meaningful figures.

Table 5.2 Target Country Land Area, Caribbean

State	Area (km^2)	Target Area (km^2)
Anguilla	91	91
Antigua & Barbuda	440	440
Barbados	430	430
British Virgin Islands	150	150
Cayman Islands	260	260
Dominica	750	750
Grenada	340	340
Guyana[10]	214,970	42,994
Jamaica	10,990	10,990
Montserrat	100	100
St Kitts & Nevis	269	269
St Lucia	620	620
St Vincent & the Grenadines	340	340
Trinidad & Tobago	5,130	5,130
Turks & Caicos Islands	430	430

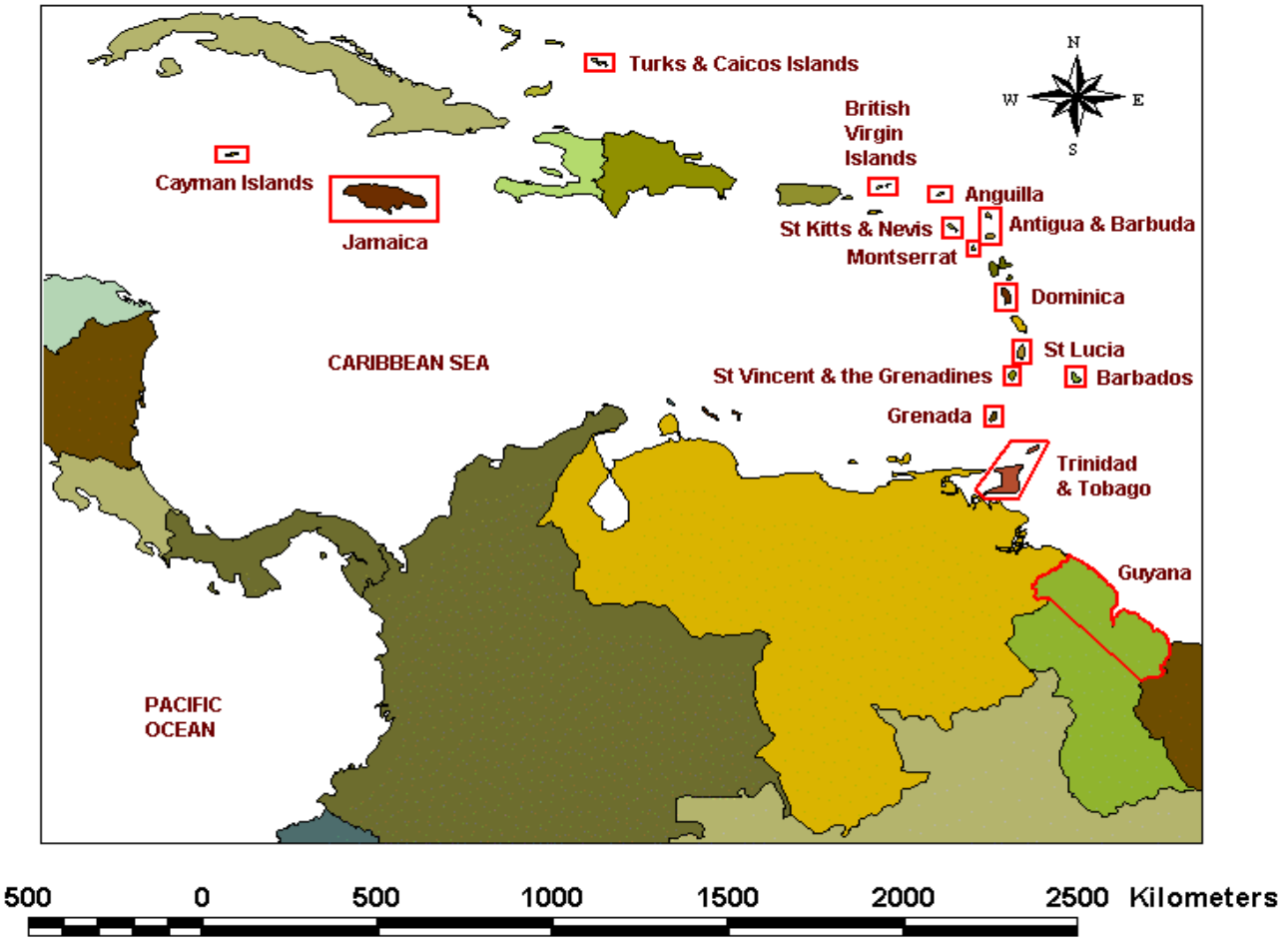
Table 5.3 Target Country Population, Caribbean

State	Population (1996)	Target Area Population
Anguilla	10,000	10,000
Antigua & Barbuda	66,000	66,000
Barbados	257,000	257,000
British Virgin Islands	13,000	13,000
Cayman Islands	35,000	35,000
Dominica	83,000	83,000
Grenada	95,000	95,000
Guyana[10]	712,000	356,000
Jamaica	2,595,000	2,595,000
Montserrat	13,000	13,000
St Kitts & Nevis	41,000	41,000
St Lucia	158,000	158,000
St Vincent & the Grenadines	118,000	118,000
Trinidad & Tobago	1,272,000	1,272,000
Turks & Caicos Islands	14,000	14,000

[10] / Contrary to expectation, in subsequent commissioning of research, Belize replaced Guyana as the target mainland state with a target land area of 22,965 km^2 and target population of 209,00 persons. Thus the inclusion of Guyana rather than Belize in this Study's definition of the Caribbean slightly overestimates the values for total target area and total population respectively.

Map 7: Caribbean – Land Water Interface

National Land Area 235,310 km^2 Production System Area 63,334 km^2



5.6 GHANA

Production system – Forest Agriculture Interface

Scenario 1 – disturbed deciduous forest belt and forest-savanna transition (part)
Based on LGP of 9-10 months. Forms a band across country extending from the eastern border and Lake Volta across Ashanti region. Takes in all of Ashanti region, western Brong Ahafo, northern third of Eastern and the central portion of Volta region.

Scenario 2 – forest-savanna transition (part) with derived savanna
Based on LGP of 8 months. Forms a band across the country from northern Lake Volta. The southern half of Northern province, the eastern portion of Brong Ahafo and the northern third of Volta province.

Land Area Area mapped using ArcView, calculated in km_.

Population Calculated by applying the same proportion of the land area occupying the target zone to the population. As the provincial population data obtained was dated 1984, totals were increased by 55% to reflect the growth in the total population to the 1998 UN estimate:

	Province	1984 Census	% Applied	Target Pop.	Plus 55%
Scenario 1	Ashanti	2,090,000	100	2,090,000	3,239,500
	Brong-Ahafo	1,207,000	100	1,207,000	1,870,850
	Eastern	1,681,000	30	504,300	781,665
	Volta	1,212,000	50	606,000	939,300
Scenario 2	Brong-Ahafo	1,207,000	25	301,750	467,712
	Northern	1,165,000	30	582,500	902,875
	Volta	1,212,000	50	363,600	563,525

Road Density Estimated density of roads in target area using International Travel Maps: Ghana. Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Major towns identified from Times Atlas and UN data. As the two scenarios occupy different areas the towns under consideration are also different and so may range in size and significance.

Assessment of Export Potential It is estimated that there would be no more than 100 km to travel to a main town in the southerly target area and 150 km in the northerly zone. The major towns on the coast lie outside both target areas and are 200-300 km distant.

Land Productivity Potential A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. This assessment does not include tourism.

Poverty Status National data obtained from UNDP *Human Development Report* and WHO website.

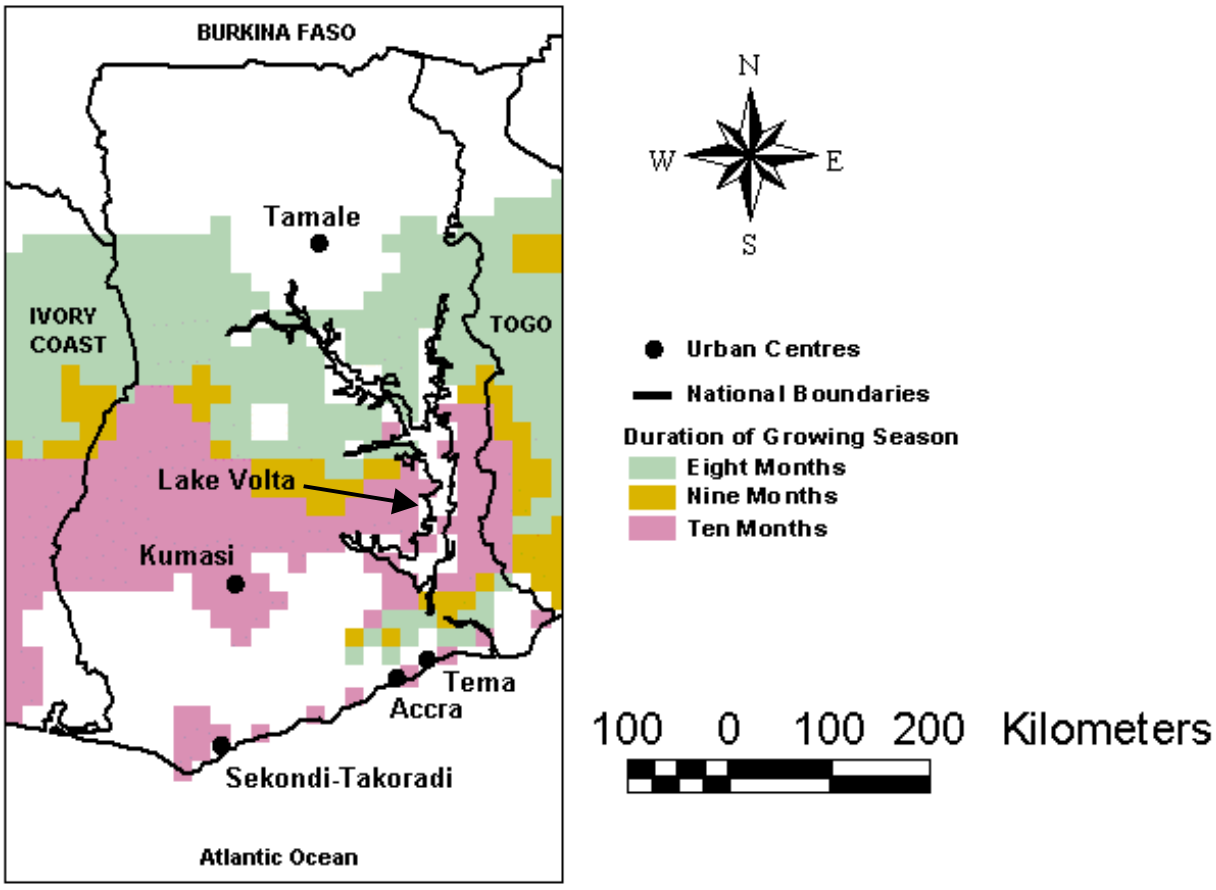
NR Knowledge Base Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Map 8: Ghana – Forest Agriculture Interface

As defined by length of growing period, 8-10 months

National Land Area 239,981 km^2

Combined Production System Area 122,238 km^2



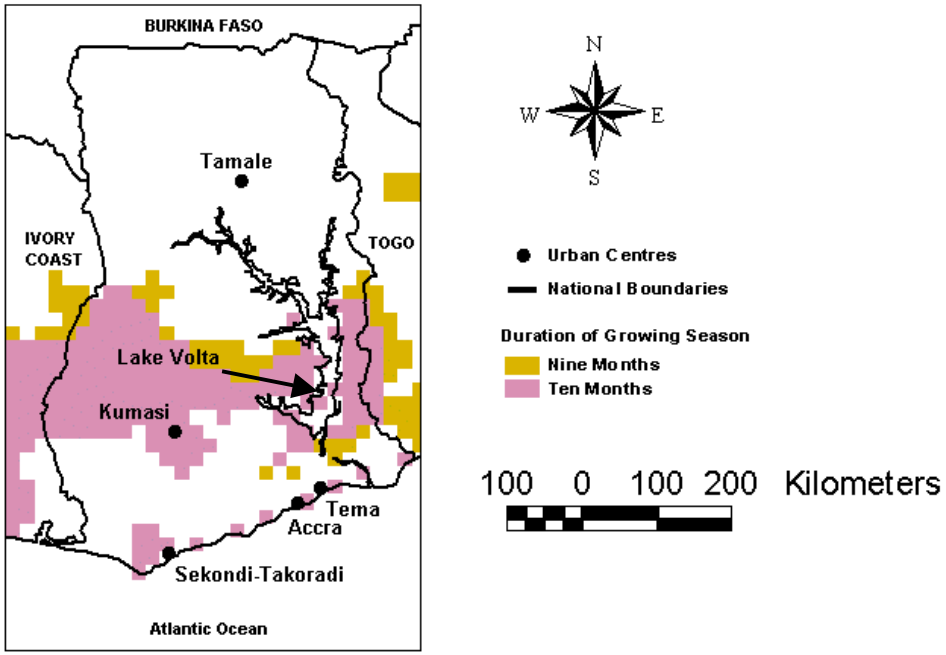
Map 9: Ghana – Forest Agriculture Interface (two scenarios)

Scenario 1

Length of Growing Period 9-10 Months

National Land Area 239,981 km^2

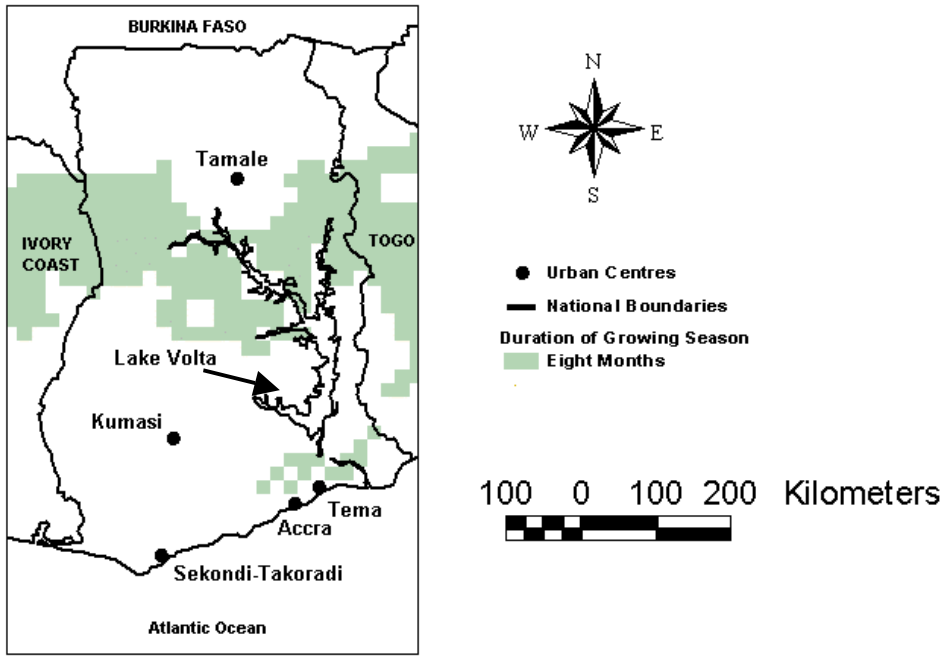
Production System Area 67,123 km^2



Scenario 2

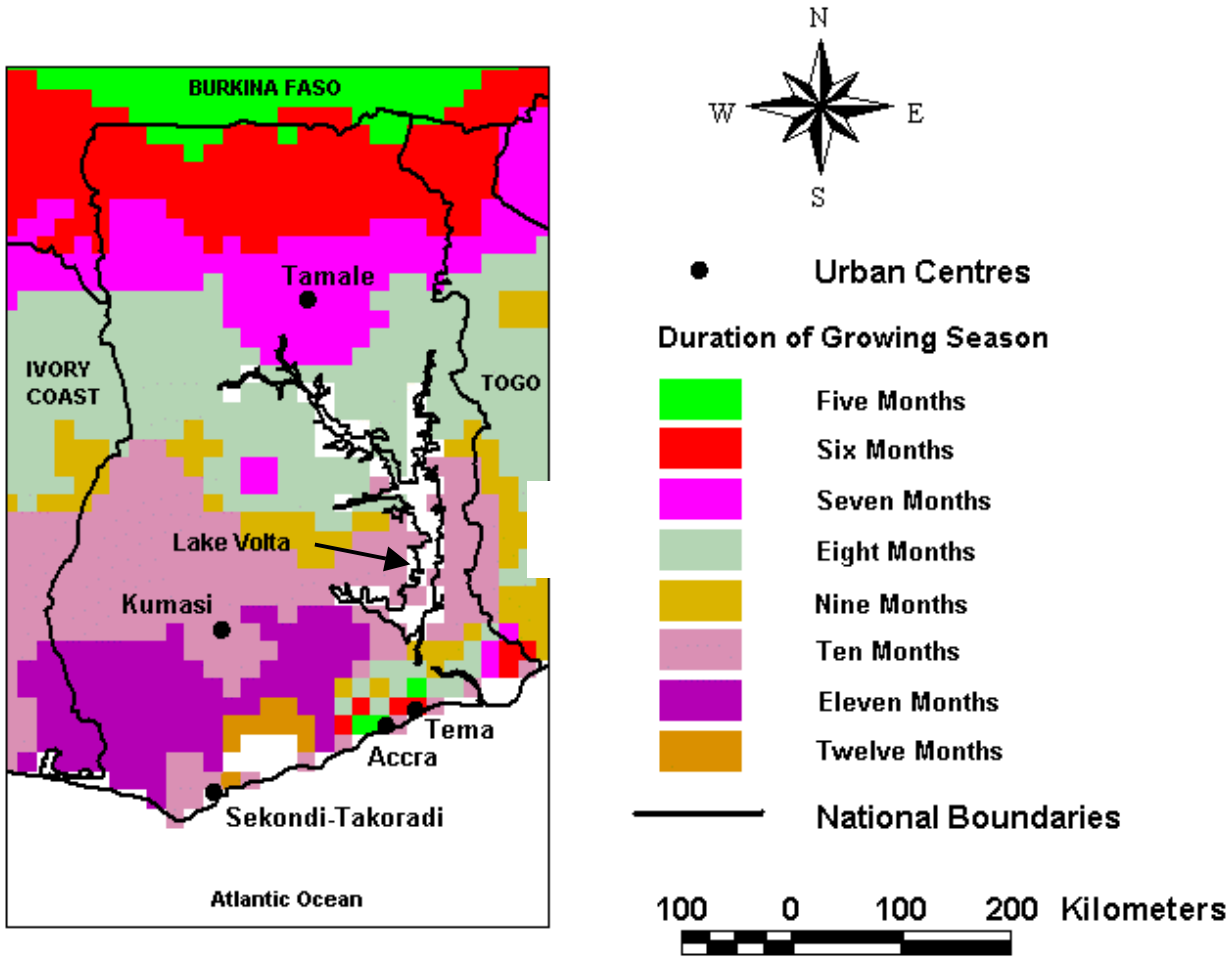
Length of Growing Period 8 Months

Production System Area 55,115 km^2



Map 10: Ghana – Length of Growing Period

National Land Area 239,981 km^2



5.7 GHANA

Production system – Peri-Urban Interface

Cities with population of more than 100,000 persons:
Accra
Kumasi (this is the NRSP target city region)
Sekondi-Takoradi
Tamale
Tema

Land Area Not available.

Population Refer to the city population table below.

City	City Area (1984 Census + 55%)	Metropolitan Area (1998 estimate)	Peri-Urban Population
Accra	1,344,561	2,218,000	873,439
Kumasi	583,186	700,000	116,814
Sekondi-Takoradi	144,770	300,000	155,230
Tamale	210,725	300,000	89,275
Tema	203,868	250,000	46,132

City populations from the 1984 Census scaled up by 55% to reflect the general increase in the country's population (may be greater if the rate of urbanisation is higher than population growth rate). Metropolitan area populations were from FWKC encyclopaedia (1998 estimates). It should be noted that Tema lies within Greater Accra administrative district and it is unclear from the source documents if the data for Greater Accra refer to this district or are a general term for the metropolitan area. There may therefore be some double counting.

Road Density On the scale employed here (5 = dense, 1 = sparse) a value of 5 has been applied.

Demand Side Assessment N/a

Assessment of Export Potential N/a

Land Productivity Potential N/a

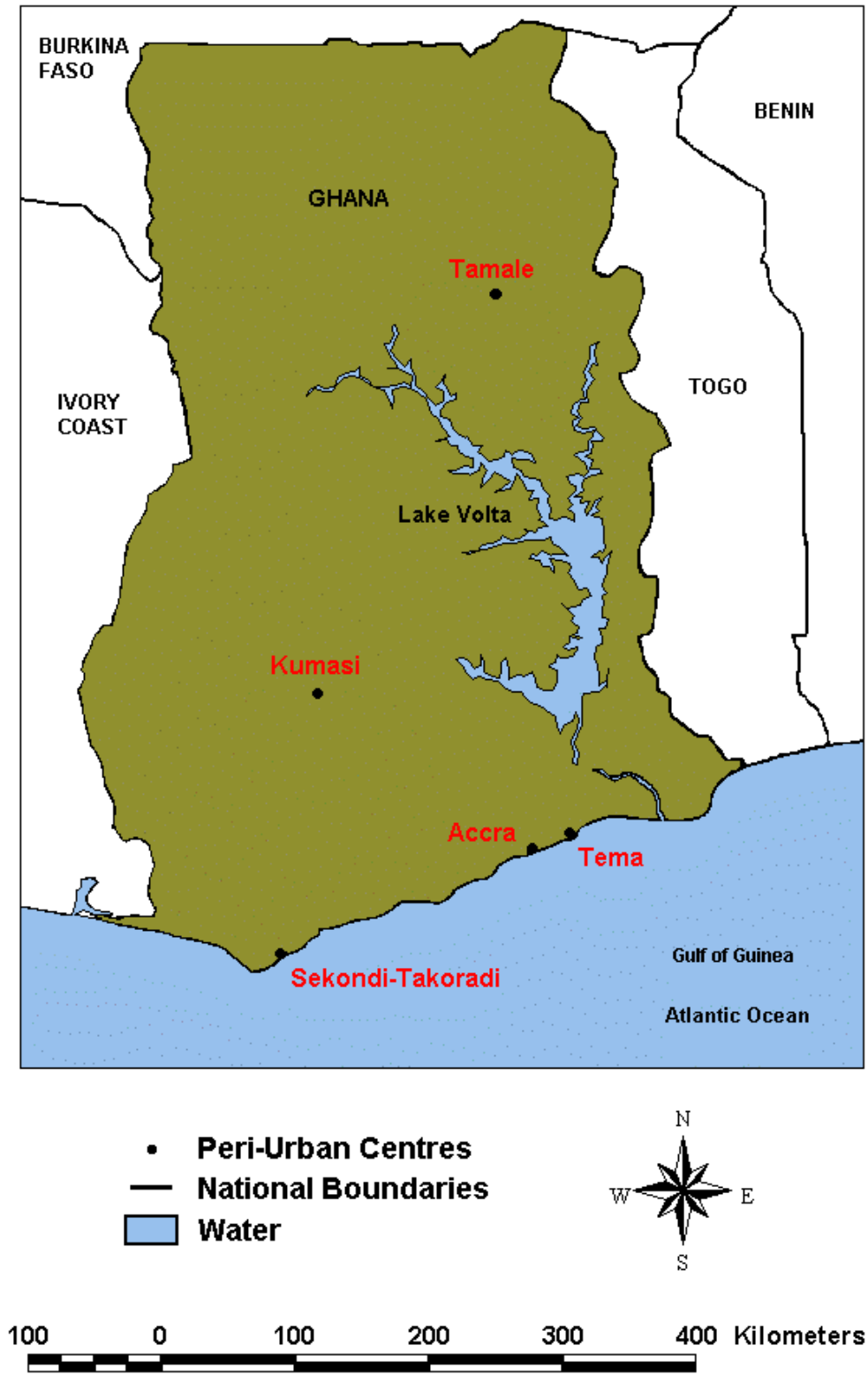
Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Map 11: Ghana – Peri-Urban Interface

Peri-Urban Cities with Population of > 100,000 persons

National Land Area 239,981 km^2



5.8 INDIA

Production system – High Potential

Scenario 1	Scenario 2
Lower Indo-Gangetic Plain (eastern Uttar Pradesh, and northern Bihar at altitudes of below 150 metres with rainfall in the range 1250-1750 mm, and LGP up to 180 days per year). Characterised as subtropical and low altitude with alluvial soils. Mixed irrigated and rainfed, with mixed cropping.	Scenario 1 area plus the upper Plain area of western Uttar Pradesh into Haryana and Punjab at altitudes between 150 and 500 metres. Predominantly irrigated wheat-based systems with rainfall towards the drier end of the range 1250-1750 mm.

Land Area Area mapped using ArcView which calculated area in km_.

Population Population of target area calculated by applying percentage of state land area occupied:

Scenario 1	Scenario 2
Bihar[11] (75%) Uttar Pradesh (60%). Area includes cities of Allahabad, Benares, Gorakphur, Kanpur, Lucknow, and Patna.	Bihar[11] (75%) Uttar Pradesh (80%) Haryana (90%) Delhi (100%) Punjab (90%). Area includes cities of Agra, Amritsar, Bareilly, Delhi and New Delhi plus those mentioned in Scenario 1.

Total increased by 14% to reflect increase in total population since 1991 census (refer to Table 5.4).

Road Density Estimated density of roads in target area using GeoCenter World Country Maps: India (North East) & India (South). Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Number of cities with populations greater than 500,000 persons (from the 1991 Census) per 1000 km_ of target area.

Assessment of Export Potential It is estimated that it is a maximum of 200 km to any of the major cities within the target zone. There are many smaller towns in the target area.

Land Productivity Potential By applying the same percentages to provincial data as were used to estimate population, the percentages of total production of key agricultural products which are contributed by the target areas, are as follows:

	Rice	Maize	Wheat	Pulses	Sugar	Potato	Milk
Scenario 1	14	19	26	8	27	31	14
Scenario 2	27	26	62	20	41	44	33

[11] / This considers the State of Bihar before the creation of the State of Jharkland that took in part of (old) Bihar

Land Productivity Potential contd.

A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40- 60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data from the *Statistical Abstract of India* and maps from the FAO/GIEWS website. This assessment does not include tourism.

Poverty Status

National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base

Data for degree level of national researchers not available. Number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Table 5.4 Census Data 1991, India

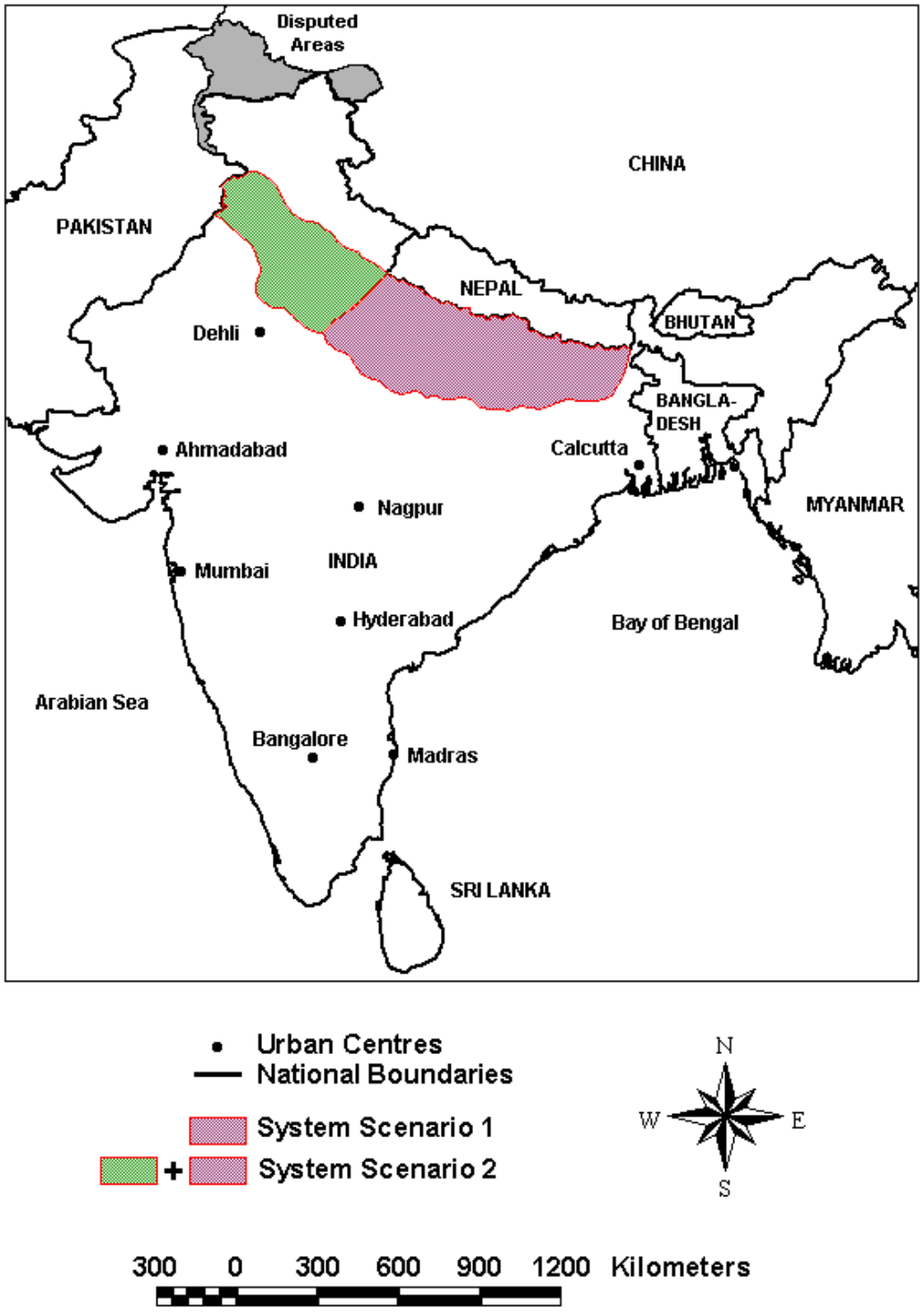
State/City	Population	% Rural
Bihar	86,374,465	87
Uttar Pradesh	139,112,287	80
Haryana	16,463,648	75
Punjab	20,281,969	70
Delhi	9,240,644	10
Agra	948,063	
Allahabad	844,546	
Amritsar	708,835	
Bareilly	617,350	
Benares	925,000*	
Gorakpur	505,566	
Kanpur	2,029,889	
Lucknow	1,669,204	
New Delhi	301,297	
Patna	1,099,647	
(*estimate ESRI 1998)		

Map 12: India – High Potential Production System

National Land Area 3,089,282 km^2

System Scenario 1 309,929 km^2

System Scenario 2 483,739 km^2 (173,810 km^2 + 309,929 km^2)

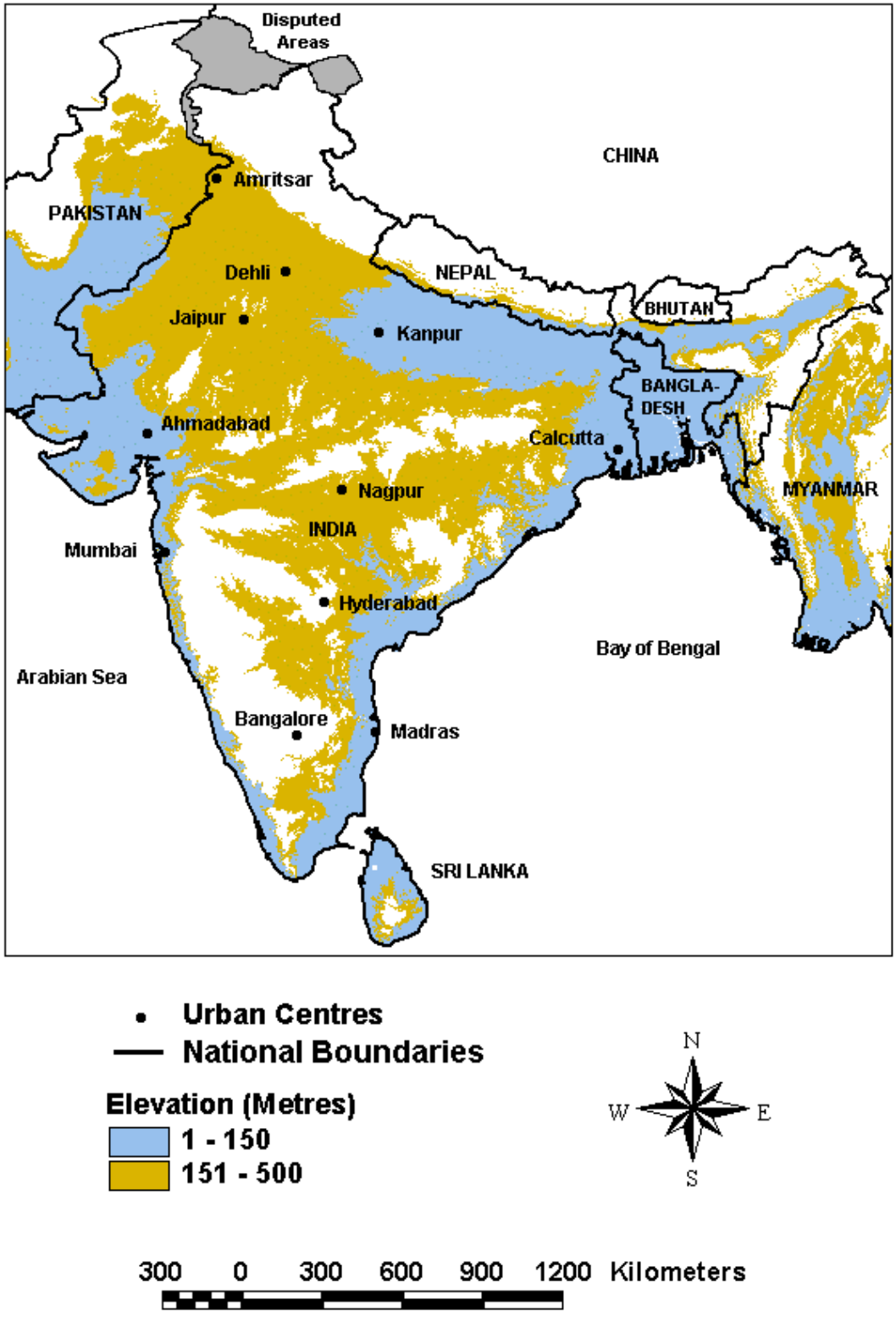


Note: This Map was based on an elevation map of India and ICRISAT production systems

Map 13: India – Elevation

Range 1 metre to 500 metres

National Land Area 3,089,282 km^2



5.9 INDIA

Production system – Semi-Arid

Scenario 1

Semi-arid agro-ecologicial zone consisting of two sub-systems: dry semi-arid (500-750 mm annual rainfall and 90-120 days LGP) and moist semi-arid (750-1000 mm and 90 –150 days). The target zone extends from Tamil Nadu through inland Karnataka, eastern Andhra Pradesh, inland Maharashtra, western Madhya Pradesh, western Gujarat, western Rajasthan to eastern Uttar Pradesh and northern Haryana and Punjab.

Scenario 2

Scenario 1 plus the dry sub-humid sub-system (1000-1200 mm rainfall and 150-180 days LGP). The target area is as Scenario 1 with the addition of eastern Maharashtra, western Madhya Pradesh, western Uttar Pradesh, central Bihar and south eastern Gujarat.

The areas selected correspond partially with AEZ mapping found in various literature sources. For this reason wider and narrower definitions have been mapped

Land Area Area mapped using ArcView, calculated in km_.

Population Calculated using the approximate land area covered by the target area and allocating population from the 1991 census using the same percentage. The national rural population percentage (74%) was applied. The table below gives the relevant data. 1991 data has been increased by 14% to reflect the increase in the national population.

Scenario 1	Scenario 2
The following cities are located within the target area: Agra, Ahmadabad, Allahabad, Amritsar, Bangalore, Bareilly, Delhi, Gandhinagar, Gwalior, Jaipur, Jamnagar, Kanpur, Kota, Ludhiana, Madurai, Mysore, New Delhi, Solapur, Tiruchchirappali, Udaipur and Vadodara (see Table 5.5).	In addition to the cities listed above this wider target area also includes Allahabad, Benares, Bhopal, Mumbai, Chandigargh, Gorakhpur, Hyderabad, Lucknow, Madras, Nagpur, Patna, Pune, Surat and Varanasi (see Table 5.6).

Road Density Estimated density of roads in target area using GeoCenter World Country Maps: India (North East) & India (South). Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Number of cities with populations greater than 500,000 (from 1991 Census) per 1000 km_ of target area.

Assessment of Export Potential It is estimated that it is a maximum of 200 km to any of the major cities within the target zone. There are many smaller towns in the target area.

Land Productivity Potential By applying the same percentages to provincial data as were used to estimate population, the percentages of total production of key agricultural products which are contributed by the target areas are as follows:

	Rice	Maize	Wheat	Pulses	Banana	Sugarcane	Coffee	Potato	Milk
Scenario 1	30	32	35	27	46	47	54	22	38
Scenario 2	48	55	59	45	66	73	60	43	58

Land Productivity Potential contd. A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data from the *Statistical Abstract of India* and maps from the FAO/GIEWS website. This assessment does not include tourism.

Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base Data for degree level of national researchers not available. Number of agricultural research scientists and percentage of GDP allocated to agricultural research were obtained from ISNAR website.

Table 5.5 Scenario 1 – Population, India

State / U.T.	Total Population ('000)	% Applied	Population ('000)	% Rural
Andhra Pradesh	66508	60	39904.8	73
Delhi	9421	100	9421.0	10
Gujarat	41310	60	24786.0	66
Haryana	16464	40	6585.6	75
Karnataka	44977	70	31483.9	69
Madhya Pradesh	66181	25	16545.3	77
Maharashtra	78937	50	39468.5	61
Punjab	20282	40	8112.8	70
Rajasthan	44006	40	17602.4	77
Tamil Nadu	55859	60	33515.4	60
Uttar Pradesh	139112	40	55644.8	80

Table 5.6 Scenario 2 – Population, India

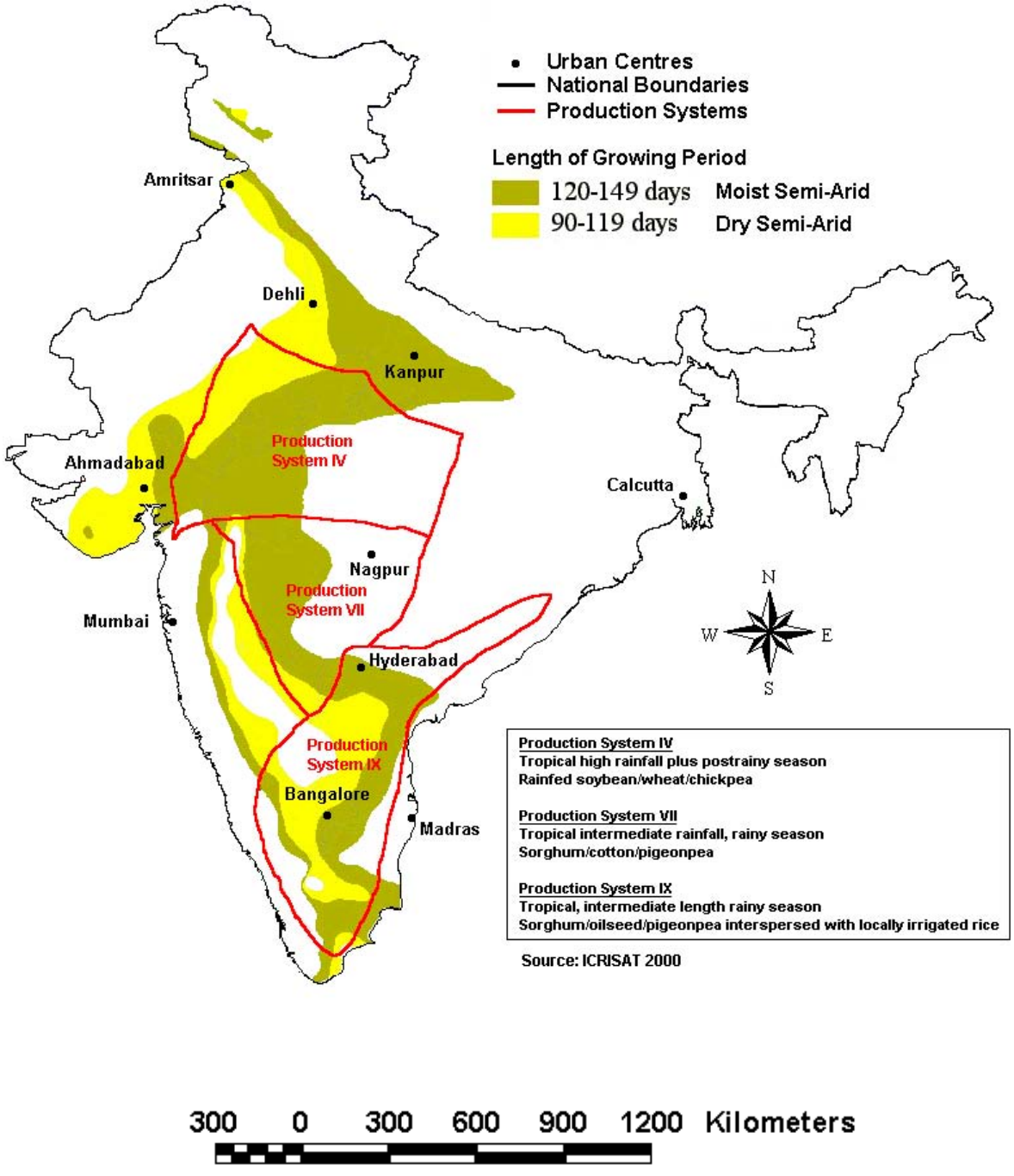
State / U.T.	Total Population ('000)	% Applied	Population ('000)	% Rural
Andhra Pradesh	66508	80	50273.1	73
Bihar	86374	50	43187.0	87
Chandigargh	642	100	642.0	10
Delhi	9421	100	9421.0	10
Gujarat	41310	70	28917.0	66
Haryana	16464	50	6585.6	75
Karnataka	44977	75	33732.8	69
Madhya Pradesh	66181	70	46326.7	77
Maharashtra	78937	75	59202.8	61
Punjab	20282	50	10141.0	70
Rajasthan	44006	40	17602.4	77
Tamil Nadu	55859	90	50273.1	60
Uttar Pradesh	139112	75	104334.0	80

Map 14: India – Semi-Arid, Scenario 1

Production Systems with 3 to 5 Months Length of Growing Period

National Land Area 3,089,282 km^2

Semi-Arid Area 1,027,260 km^2

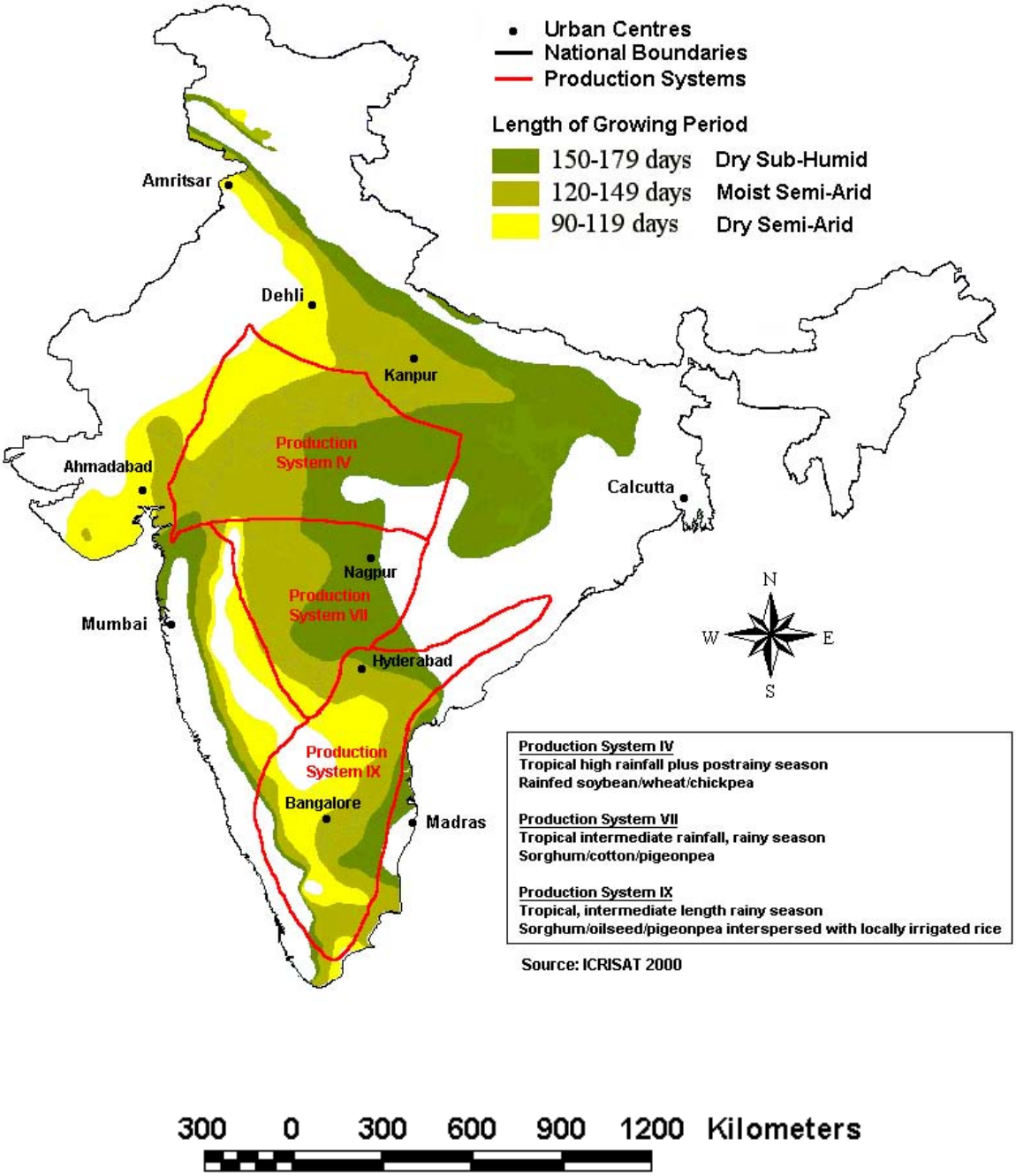


Map 15: India – Semi-Arid, Scenario 2

Production Systems with 3 to 6 Months Length of Growing Period

National Land Area 3,089,282 km^2

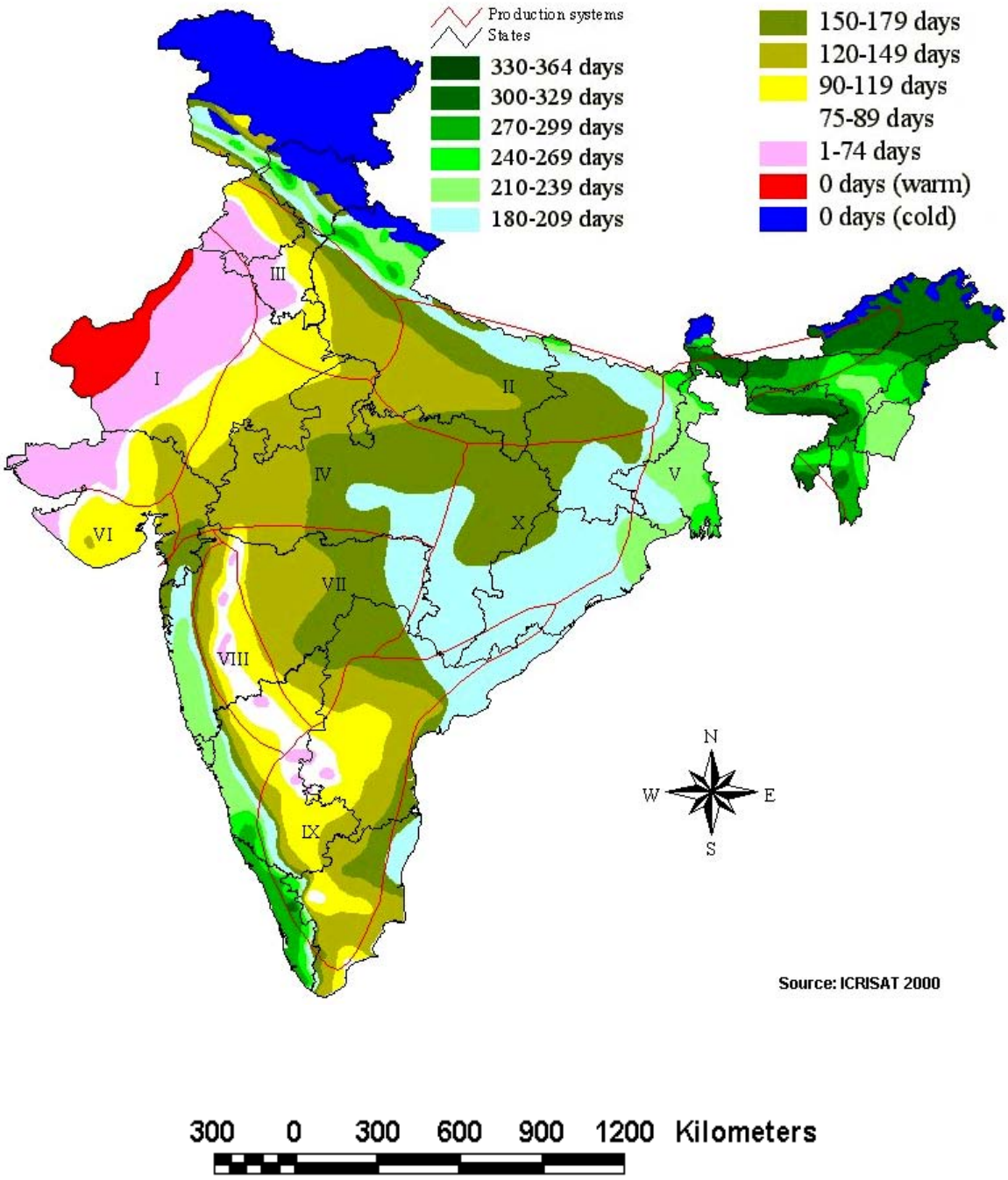
Dry Sub-Humid & Semi-Arid Areas 1,620,487 km^2



Map 16: India – Agricultural Production Systems

Length of Growing Period and ICRISAT Production Systems

National Land Area 3,089,282 km^2



5.10 INDIA

Production system – Peri-Urban Interface

Random selection of cities: two 'mega', two large, two medium and two small. Cities selected: Agra, Bangalore, Mumbai, Kolkata, Kharagpur, Hubli-Dharwad, Hyderabad, and Shillong. The twin cities of Hubli and Dharwad form the NRSP target city region[12].

Land Area City areas were only available for Bangalore (366 km^2), Calcutta (852 km^2) and Hyderabad (217 km^2) and it is unclear whether these refer to the city or the metropolitan area.

Population 1991 census populations of the selected cities and their metropolitan areas increased by 14% to reflect the general increase in population.

City	City Population	Metropolitan Population	Peri-Urban Population
Agra	1,016,641	1,080,792	64,151
Bangalore	3,032,500	4,708,528	1,676,028
Hubli-Dharwad	739,060	(estimate) 855,000	115,940
Hyderabad	3,379,687	4,952,658	1,572,971
Kharagpur	202,908	301,920	99,012
Kolkata	5,015,794	12,564,987	7,549,193
Mumbai	11,315,516	14,359,717	3,044,201
Shillong	150,160	254,637	104,477

The data depends on the definition of the city boundaries (compare Mumbai and Kolkata) and may not be a guide to the density of the population.

Road Density Assumed that urban environment will have high road density.

Demand Side Assessment N/a

Assessment of Export Potential N/a

Land Productivity Potential N/a

Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

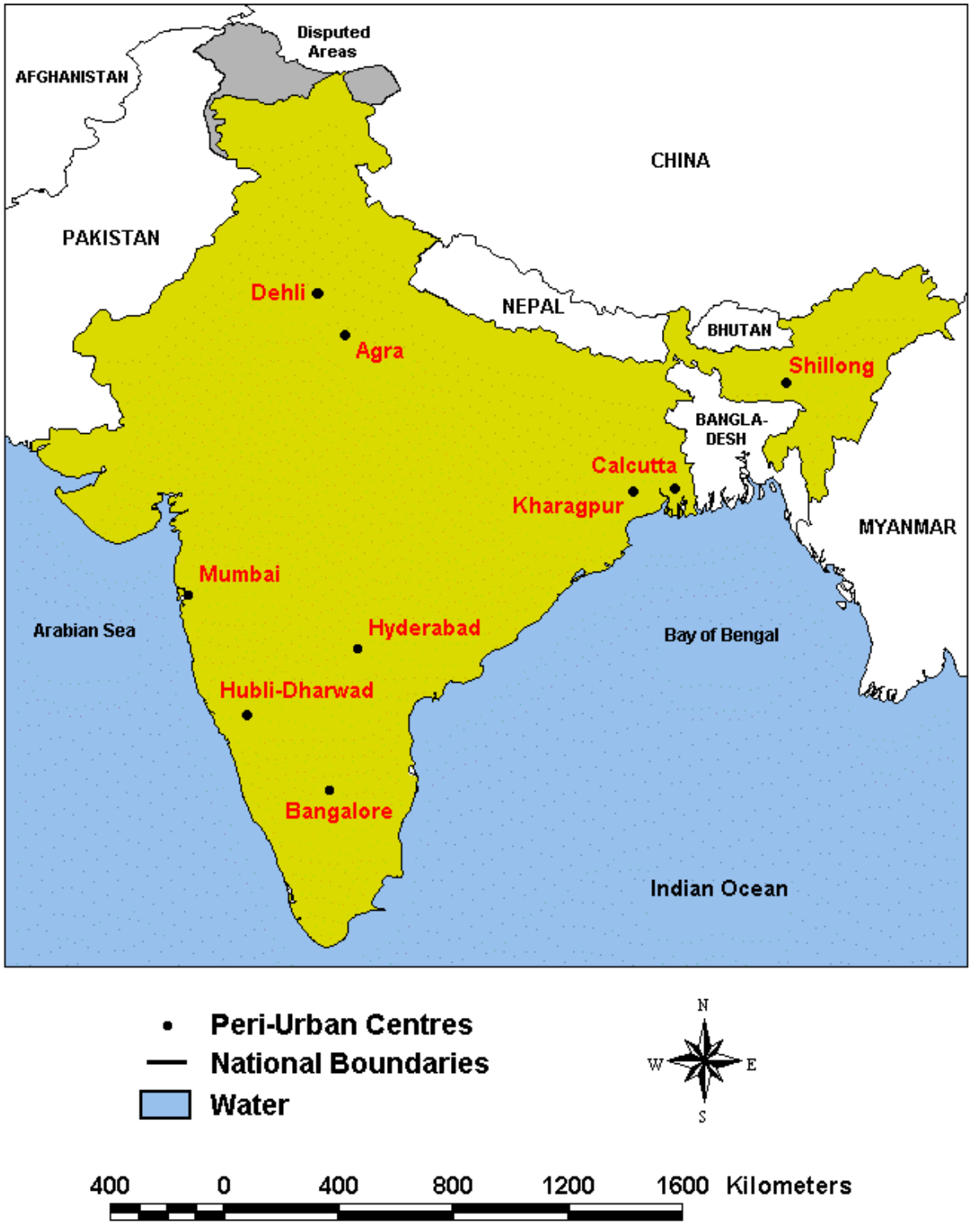
NR Knowledge Base Data for degree level of national researchers not available. Number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

[12] / One additional target city region, Kolkata, was added to the NRSP-PUI portfolio in October 2000.

Map 17: India – Peri-Urban Interface

Selected Cities for Peri-Urban Characterisation

National Land Area 3,089,282 km^2



5.11 KENYA

Production System - High Potential

Based on an interaction of rainfall, LGP and soils data. Annual rainfall >900 mm, LGP >7 mths and soil classes: Ferrasol, Luvisol, Cambisol, Nitosol, Vertisol, Planosol and Andosol. Occupies a broad western area bordering Uganda and Tanzania running south from Mount Elgon; a central area around Mount Kenya in Eastern and Central provinces; and two smaller areas covering the lower north eastern slopes of Mount Kilimanjaro and the coastal hinterland region extending from Malindi to the Tanzanian border in Coast province.

Land Area Area mapped using ArcView, calculated in km_.

Population Population was calculated using 1998 provincial population data and approximating the proportions of those provinces falling within the target area. As the area is the region of greatest population density a judgement was made as to the percentage of the provincial population to include. The total calculated was then increased by 35% to reflect the difference between the 1989 EIU data and the UN 1998 estimate for total population.

Province	1998 Population	% Applied	Target Population	Plus 35%
Central	3,117,000	100	3,117,000	4,207,950
Coast	1,829,000	55	1,005,950	1,358,033
Eastern	3,769,000	70	2,638,300	3,561,705
Nyanza	3,507,000	100	3,507,000	4,734,450
Rift Valley	4,982,000	60	2,989,200	4,035,420
Western	2,544,000	100	2,544,000	3,434,400

Road Density Estimated density of roads in target area using GeoCenter World Country Maps: Kenya. Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Data for town populations is patchy, however from UN data and the Times Atlas twelve towns of greater than 50,000 have been identified in the target area which is the zone of greatest population density. Therefore a relatively high value (of towns per 1000 km_) was obtained.

Assessment of Export Potential It is estimated that there would be a maximum of 100 km to travel to one of these towns from within the target area.

Land Productivity Potential A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. This assessment does not include tourism.

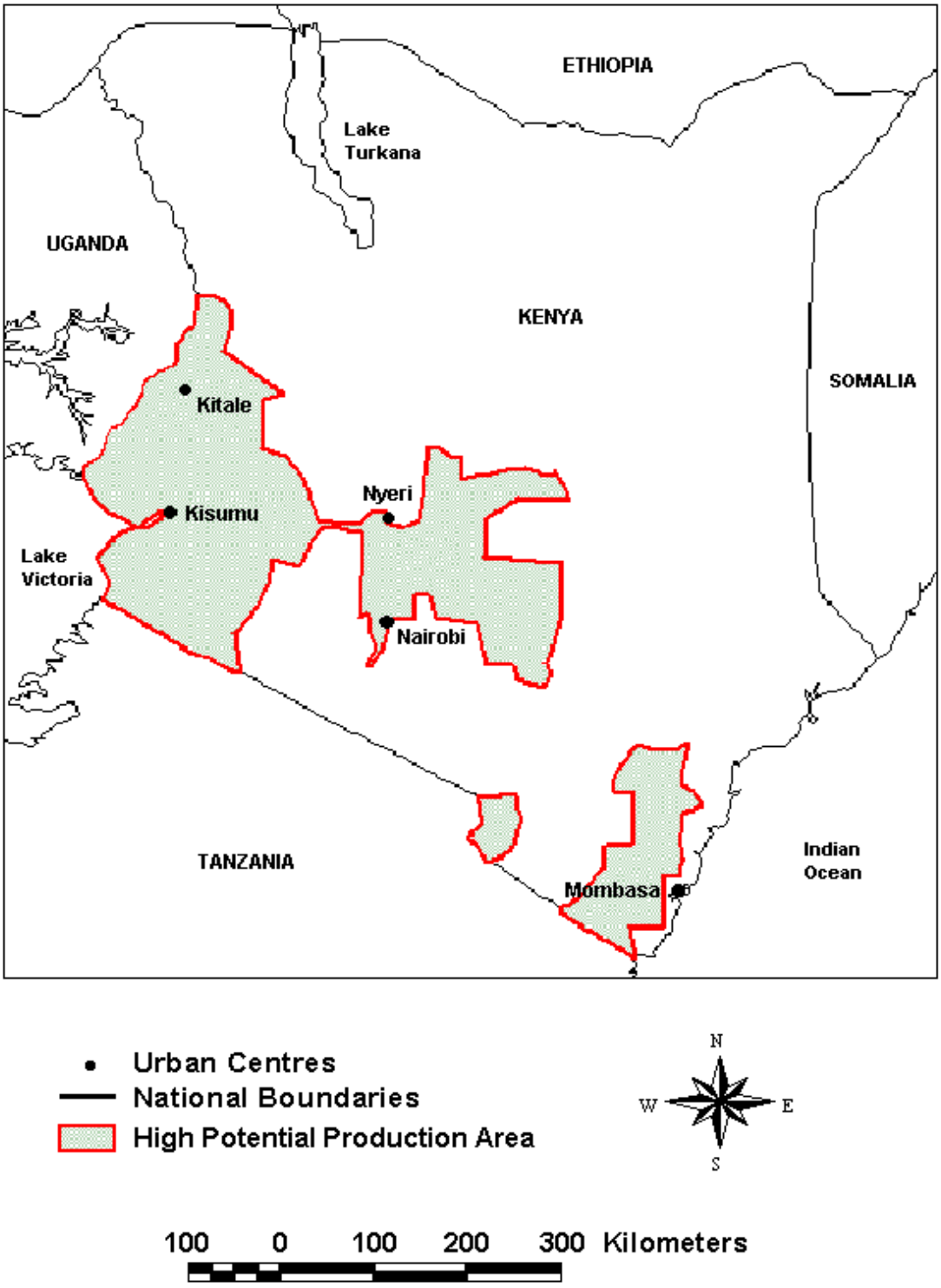
Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

Map 18: Kenya – High Potential Production System

National Land Area 580,367 km^2

Production System Area 107,551 km^2

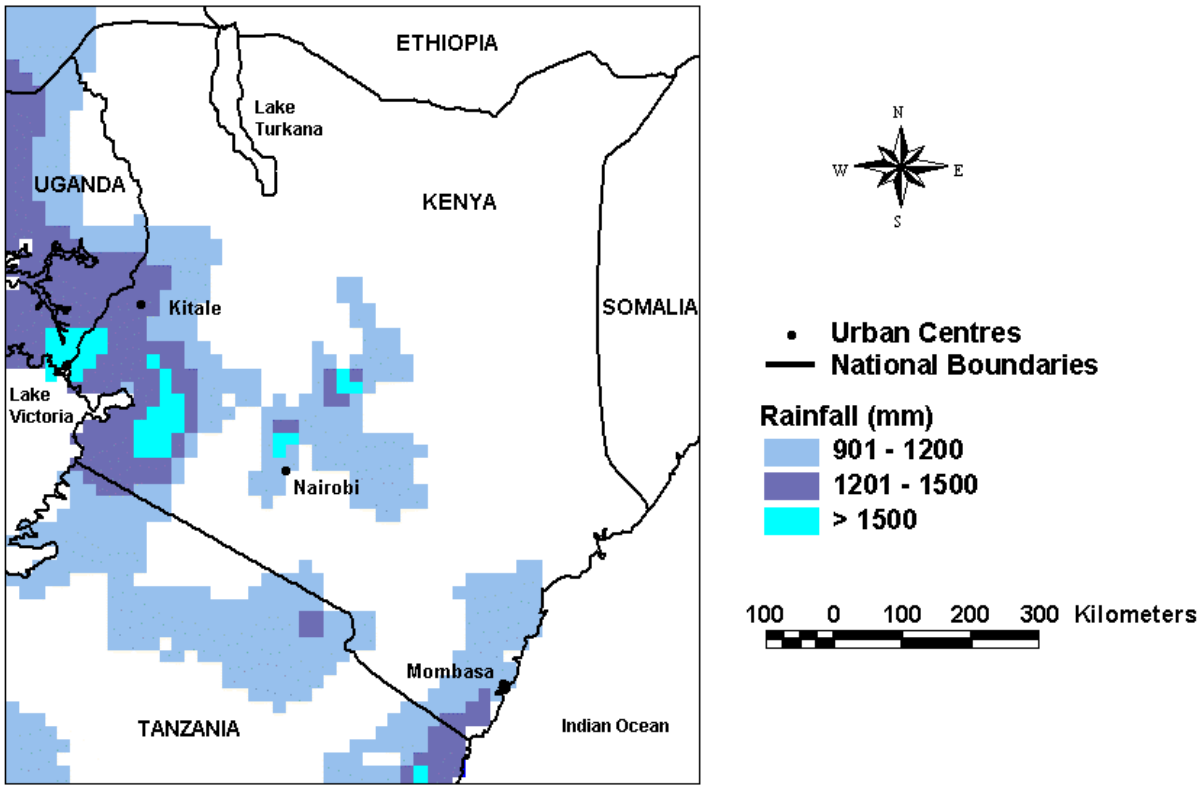


Map 19: Kenya – Annual Rainfall

Range 900 mm to >1500 mm

National Land Area 580,367 km^2

Production System Area 131,321 km^2

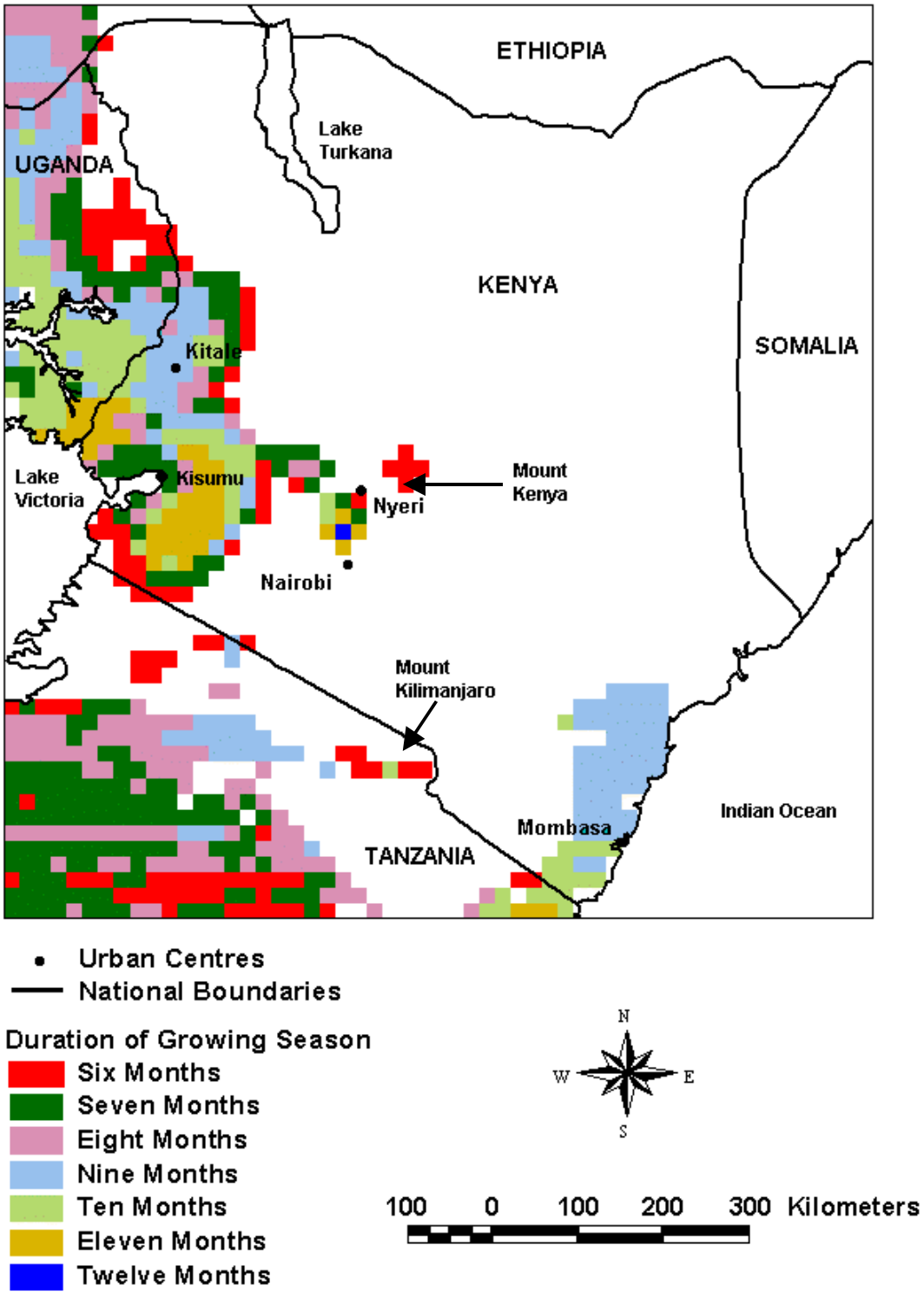


Map 20: Kenya – Length of Growing Season

Range 6 to 12 Months

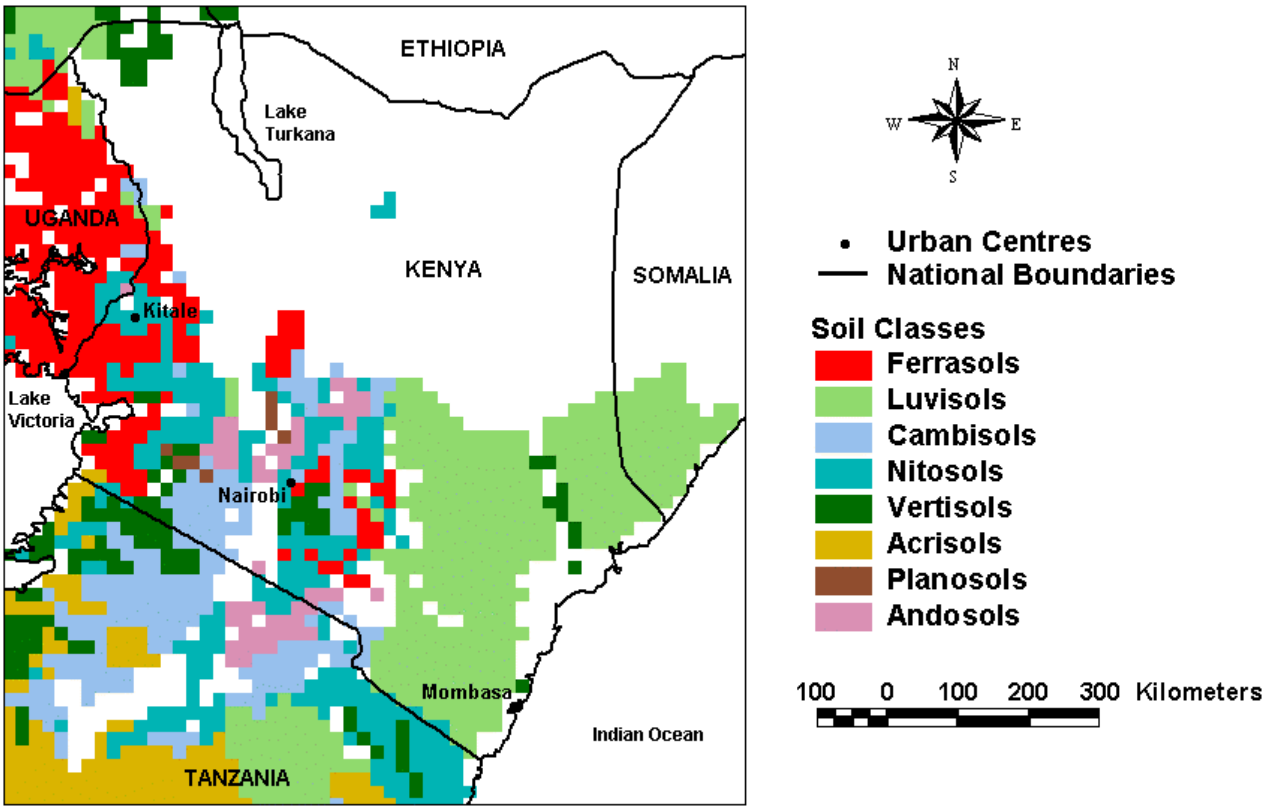
National Land Area 580,367 km^2

Production System Area 75,201 km^2



Map 21: Kenya – Soil Classes

National Land Area 580,367 km^2



5.12 NEPAL

Production Systems – Forest Agriculture Interface and Hillsides

Based on the area represented by land in the range 300-2499 metres altitude. It includes the central band of the country and the higher elevation valleys of the Himalaya foothills. Takes in the lands characterised as low, mid and high hills but not the lower (60-300 m) 'Terai' and does not go beyond the altitude limits of staple crops such as rice and potato.

Land Area Area mapped using ArcView, calculated in km_.

Population Calculated using 1981 population data detailed by administrative district. The small districts were approximately equated with the target area and totalled. The total is comprised as follows:

FAR WESTERN		MID WESTERN		WESTERN		CENTRAL		EASTERN	
Dadeldhura	868853	Dang Deokhuri	266393	Arghkhach	157304	Sindhuli	183705	Ilam	178356
Doti	153135	Pyuthan	157669	Gulumi	238113	Ramechhap	161445	Dhankuta	129781
Baitadi	179316	Rolpa	168116	Palapa	214442	Dholakha	150576	Terhathum	95542
Achham	185212	Jajarkot	99312	Baglung	215228	Makawanpur	243411	Bhojpur	192689
Bajura	74649	Salyan	152063	Kaski	221272	Kathmandu	422237	Udayapur	159805
		Surkhet	166196	Tanahu	223438	Dhading	243401	Khotang	215571
		Dailekh	166527	Syangja	271824	Khavrepalanchok	307150	Okhaldhun	137640
				Gorkha	231292	Parsa	284338		
				Lamjung	152720	Lalitpur	184341		
						Bhaktapur	159767		
						Nuwakot	202976		

The resulting figure was then increased by 45.6% to reflect the growth in the total Nepalese population between the 1981 data and the UN mid 1998 estimate. The national urban percentage of 10.9% was applied to this figure as the Kathmandu district falls within the target zone.

Road Density Estimated density of roads in target area using International Travel Maps: Nepal. Scale used: 5 = dense, 1 = sparse.

Demand Side Assessment Number of major towns in target area per 1000 km_ of target area. No data for size of towns, and an assumption that the chosen towns were 'major' relative to the area in that they appeared in bold script in the Times World Atlas.

Assessment of Export Potential Estimated that it is a maximum of 100 km to a major town from any point in the target area. This is a linear measurement only and does not account for the terrain.

Land Productivity Potential By employing the same method as was used to estimate population it was estimated that the target area contributes the following percentages of total production of key agricultural products:

Rice	28%
Wheat	40%
Maize	69%
Millet	76%
Potato	50%
Sugarcane	10%

Land Productivity Potential contd. A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data from the *Statistical Yearbook for Nepal 1991* and maps from the FAO/GIEWS website. This assessment does not include tourism.

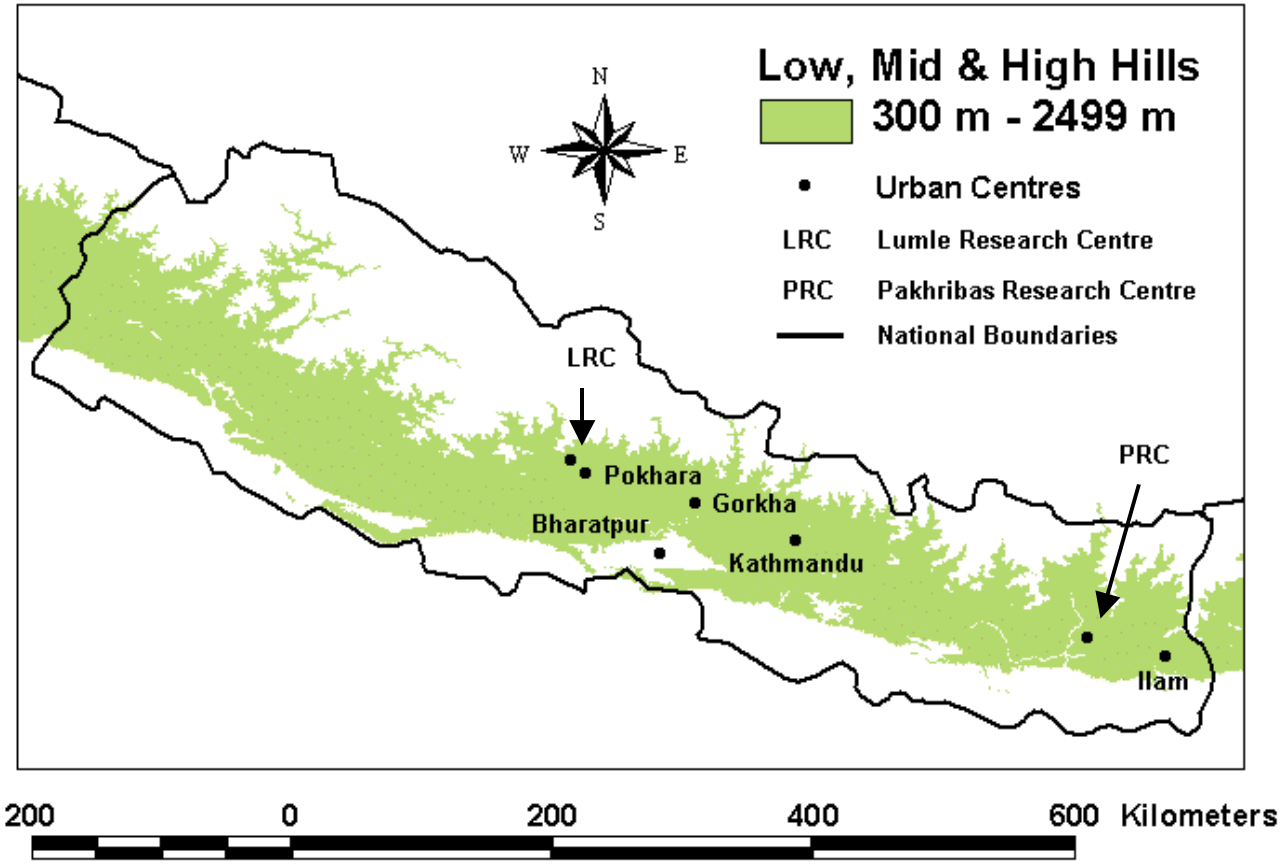
Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research not available.

Map 22: Nepal – Low, Mid and High Hills

Range 300 metres to 2499 metres elevation

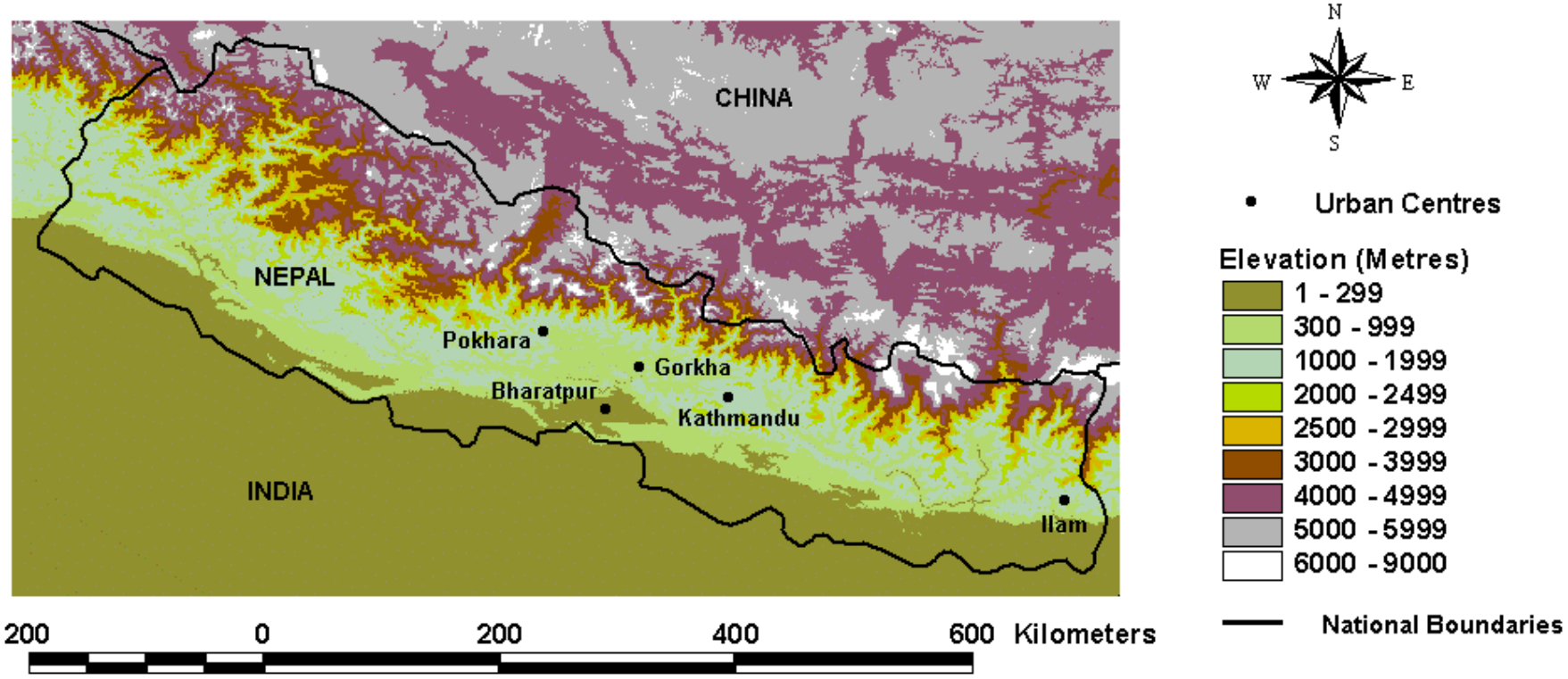
National Land Area 147,293 km^2 Production System Area 81,430 km^2



Note: This Map was based on an elevation map of Nepal

Map 23: Nepal – Elevation Map

National Land Area 147,293 km^2



5.13 TANZANIA

Production System – Semi-Arid

DFID (refer Section 3.2) has defined the semi-arid lands of Tanzania as those with annual rainfall of 300-1200 mm. This takes in most of the country except the southern hill and highland areas and parts of the coast (refer Map 24). In contrast, the FAO definition of semi-arid (74-199 days LGP – see Map 25, but commencing at 90 days) delineates the north-east to south-west dry land tract and the southern dry lands, possibly under-emphasising the central dry lands. The area of 300-900mm annual rainfall better captures the central dry lands but does not include parts of the southern areas that experience erratic rainfall.

Scenario 1	Scenario 2
Based on 300-900 mm rainfall per annum. It occupies 25-30% of country: in Arusha province around Lake Natron and the central areas of Shinyanga, Singida , Dodoma and Mbeya provinces. Compromise between 300-600 mm which only took in a small area (about 5% of the total land area) of the central plateau, and the 300-1200 mm range which covers around 90% of the country (Bourn & Blench 1999).	Based on LGP 3-6 months. It occupies the northern belt along the Kenya and Uganda border (Kagera, Mara, Arusha and Kilimanjaro provinces), the central zone (Dodoma, Iringa and Mbeya provinces) and southern areas bordering Mozambique (Ruvuma and Mtwara provinces), occupying 40-50% of the country. Inclusion of parts of Southern Highlands questionable but taking LGP 3-5 months is too restricted.

Land Area	Area mapped using ArcView, calculated in km_.
Population	Calculated from 1995 provincial population data by estimating the percentage of the province falling with in the target area and applying the same proportion to the population. The resulting total was then increased by 13% to reflect the increase in the total population since 1995 (refer to Table 5.7 and Table 5.8).
Road Density	Estimated density of roads in target area using International Travel Maps: Tanzania. Scale used: 5 = dense, 1 = sparse.
Demand Side Assessment	Main towns in target area were identified from Times Atlas. Very low values obtained for this analysis were due to size of target area and relatively few sizeable towns.
Assessment of Export Potential	Estimated 200 km maximum distance to a main town.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. The assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report*, and WHO website.
NR Knowledge Base	Data for degree level of national researchers and number of agricultural research scientists obtained from ISNAR website. Percentage of GDP allocated to agricultural research not available.

Table 5.7 Scenario 1 – Provincial Population, Tanzania

Province	1995 Population	% Applied	Target Population	Plus 13%
Arusha	1,643,000	50	820,000	926,600
Dodoma	1,502,000	100	1,502,000	1,697,260
Iringa	1,467,000	100	1,467,000	1,657,710
Kilimanjaro	1,345,000	50	672,500	759,925
Mbeya	1,792,000	15	268,800	303,744
Morogoro	1,526,000	10	152,600	172,438
Mwanza	2,280,000	30	684,000	772,920
Rukwa	843,000	5	42,150	47,630
Shinyanga	2,152,000	40	860,800	972,704
Singida	961,000	100	961,000	1,085,930
Tabora	1,257,000	15	188,550	213,061
Tanga	1,590,000	5	79,500	89,835

Table 5.8 Scenario 2 – Provincial Population, Tanzania

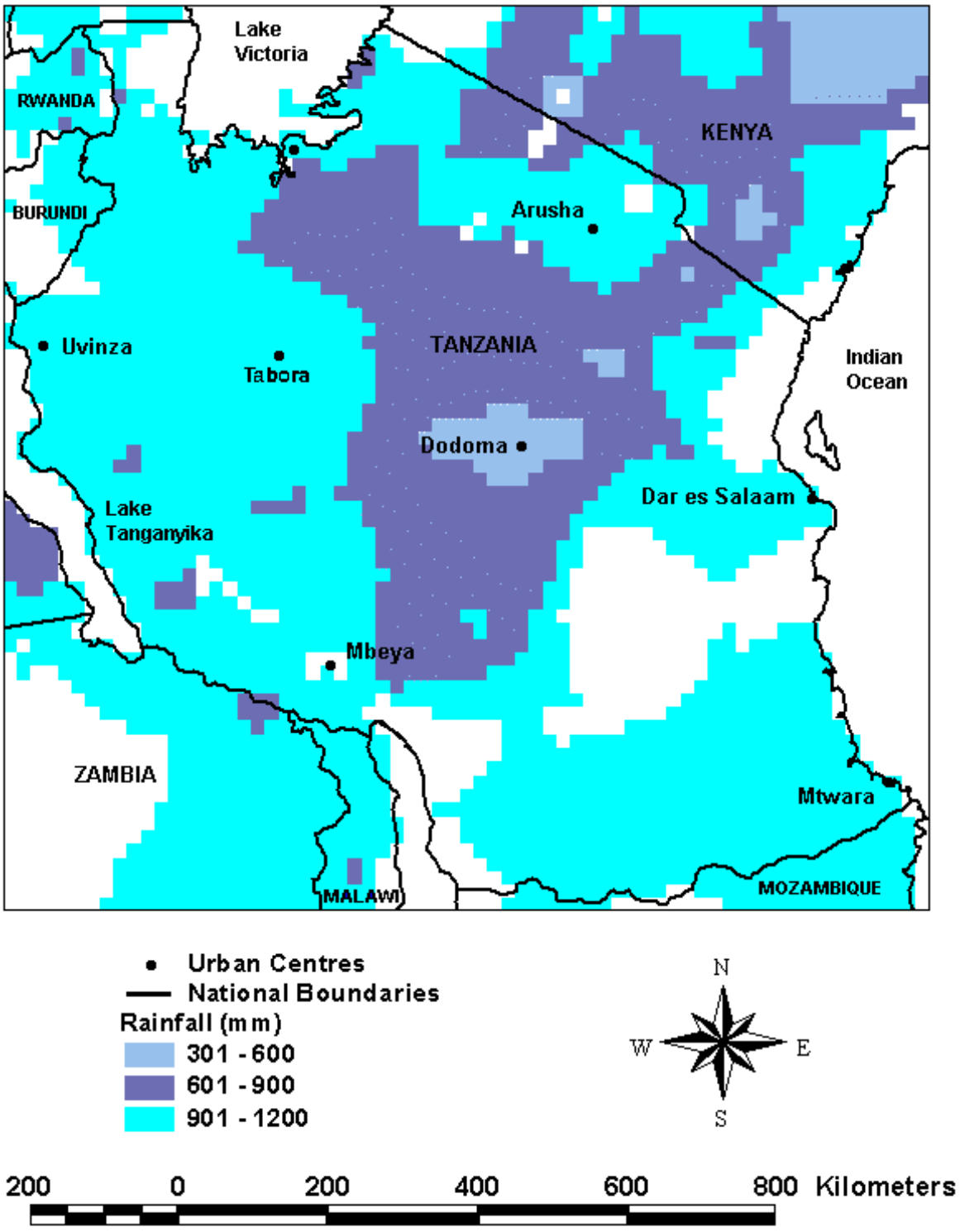
Province	1995 Population	% Applied	Target Population	Plus 13%
Arusha	1,640,000	50	820,000	926,600
Dar / Salaam	1,651,000	100	1,651,000	1,865,630
Dodoma	1,502,000	50	751,000	848,630
Iringa	1,467,000	100	1,467,000	1,657,710
Kagera	1,653,000	100	1,653,000	1,867,890
Kilimanjaro	1,345,000	100	1,345,000	1,519,850
Lindi	785,000	30	235,500	266,115
Mara	1,178,000	100	1,178,000	1,331,140
Mbeya	1,792,000	50	896,000	1,012,480
Morogoro	1,526,000	40	610,400	689,752
Mtwara	1,079,000	80	863,200	975,416
Mwanza	2,280,000	15	342,000	386,460
Pwani	774,000	40	309,600	349,248
Ruvuma	951,000	80	760,800	859,704
Shinyanga	2,152,000	20	430,400	486,352
Singida	961,000	70	672,700	760,151
Tabora	1,257,000	5	62,850	71,021
Tanga	1,590,000	60	954,000	1,078,020

Map 24: Tanzania – Semi-Arid, Scenario 1

Annual Rainfall limits 300mm to 900 mm defines Scenario 1

National Land Area 944,977 km^2

300 mm – 900 mm Area 248,282 km^2 300 mm – 1200 mm Area 829,832 km^2

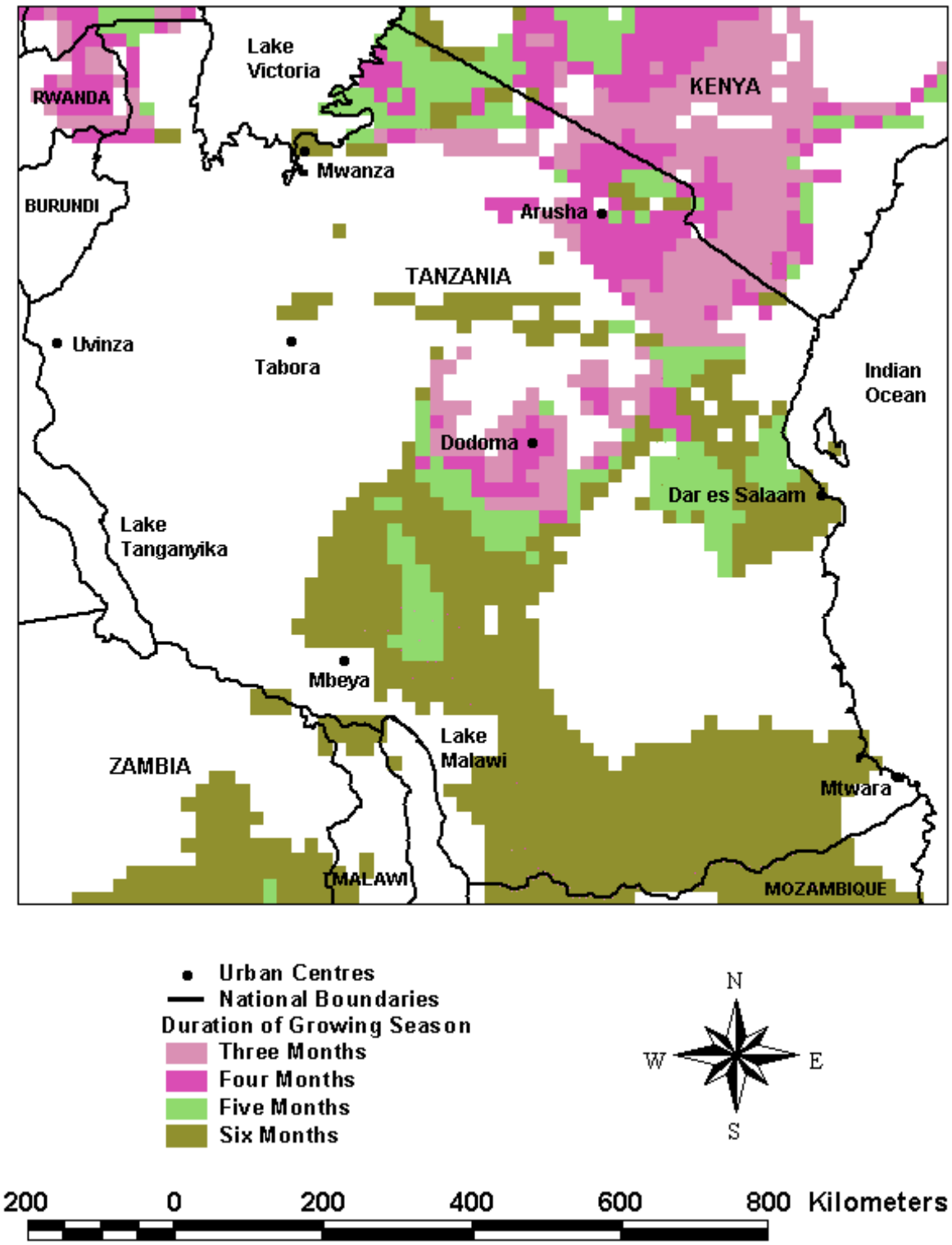


Map 25: Tanzania – Semi-Arid, Scenario 2

Length of Growing Period 3 to 6 Months

National Land Area 944,977 km^2

Production System Area 392,076 km^2



5.14 UGANDA

Production System – Hillsides

Based on land of 1500-2000 m elevation. Scattered zone around eastern and western borders of country. Rainfall around 900-1500 mm and LGPs mainly in the 9-10 month range, except in South Western Uganda around Kabale, where the LGP is in the 3-4 month range.

Land Area Area mapped using ArcView, calculated in km_.

Population Population data by district for 1990 was available from Eurostat and a judgement was made as to what proportion of each district the target area occupied. The districts were identified and a proportion of the population data according to land occurring in the target area was allocated (see Table 5.9).

The resulting total was increased by 25% to reflect the difference in the Eurostat 1990 and UN 1998 data. A calculation of population density using the target land area of 13912 km_ and population of 2,063,438 results in 148 persons per km_.

Road Density Estimated density of roads in target area using International Travel Maps: Uganda. Scale used; 5 = dense, 1 = sparse.

Demand Side Assessment Data for main towns in target area not available, however it was assumed that those shown in the Times Atlas are significant relative to the target area and in the main they are the regional administrative centres.

Assessment of Export Potential Four towns have been selected for this analysis and it is estimated that it is a maximum of 40km to the nearest main town. This does not account for the condition of the transport infrastructure. As this area is very fragmented and distributed around the frontiers of Uganda the distance to the major commercial centres in the central region of the country and those in neighbouring countries could also be considered.

Land Productivity Potential A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. The assessment does not include tourism.

Poverty Status National data obtained from UNDP *Human Development Report*, and WHO website.

NR Knowledge Base Data for degree level of national researchers obtained from ISNAR website. Number of agricultural research scientists and percentage of GDP allocated to agricultural research not available.

Table 5.9 District Population, Uganda

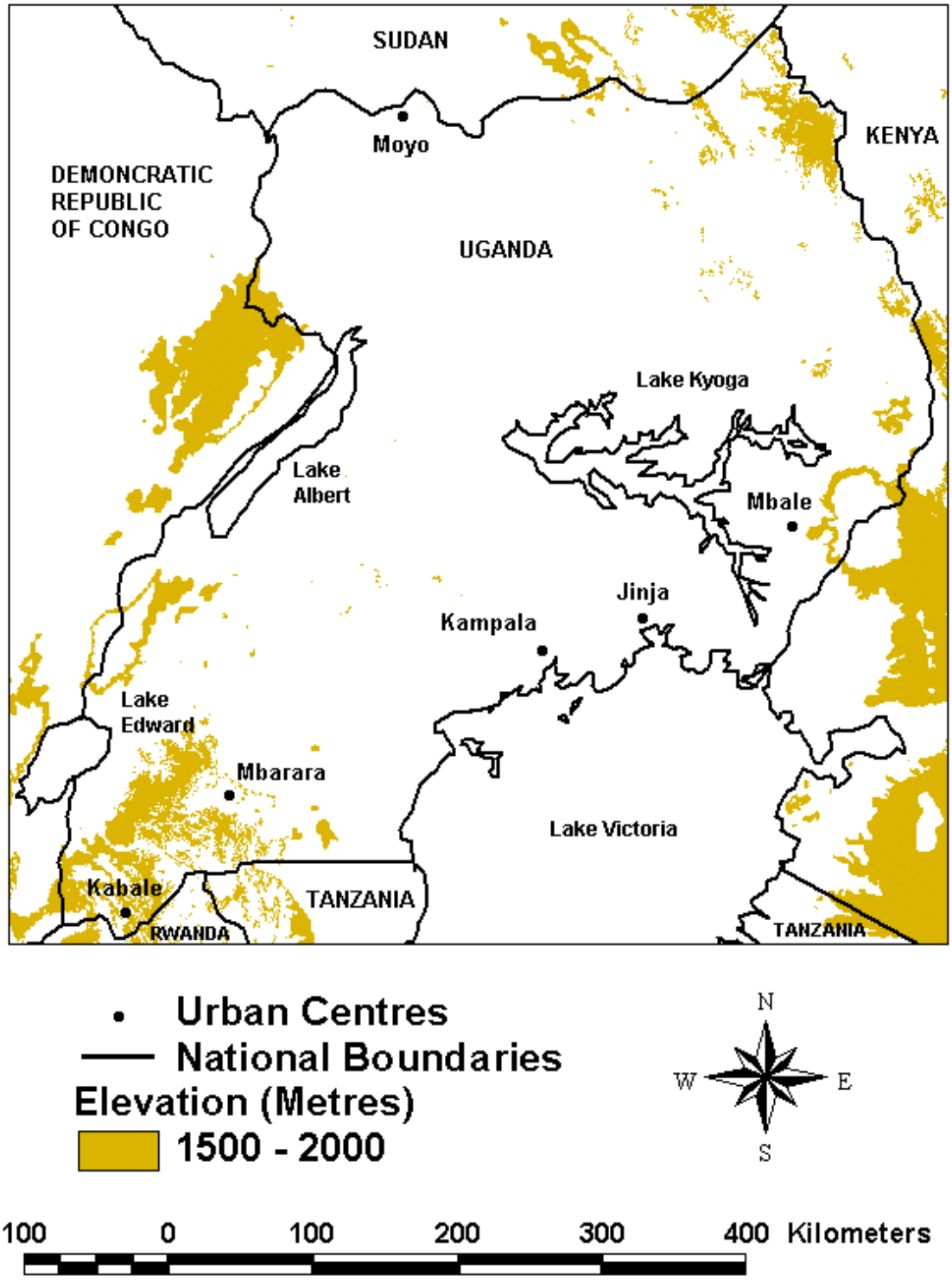
District	1990 Population	% Applied	Target Population	Plus 25%
Bundribugyo	161,000	40	64,400	80,500
Bushenyi	678,000	50	339,000	423,750
Kabale	536,000	100	536,000	670,000
Kapchorwa	90,000	30	27,000	33,750
Kasese	425,000	10	42,500	53,125
Kotido	235,000	15	35,250	44,063
Mbarara	1,000,000	15	150,000	187,500
Mbale	743,000	30	222,900	278,625
Moroto	226,000	15	33,900	42,375
Nebbi	293,000	30	87,900	109,875
Rukungiri	373,000	30	111,900	139,875

Map 26: Uganda – Hillsides

Elevation 1500 metres to 2000 metres

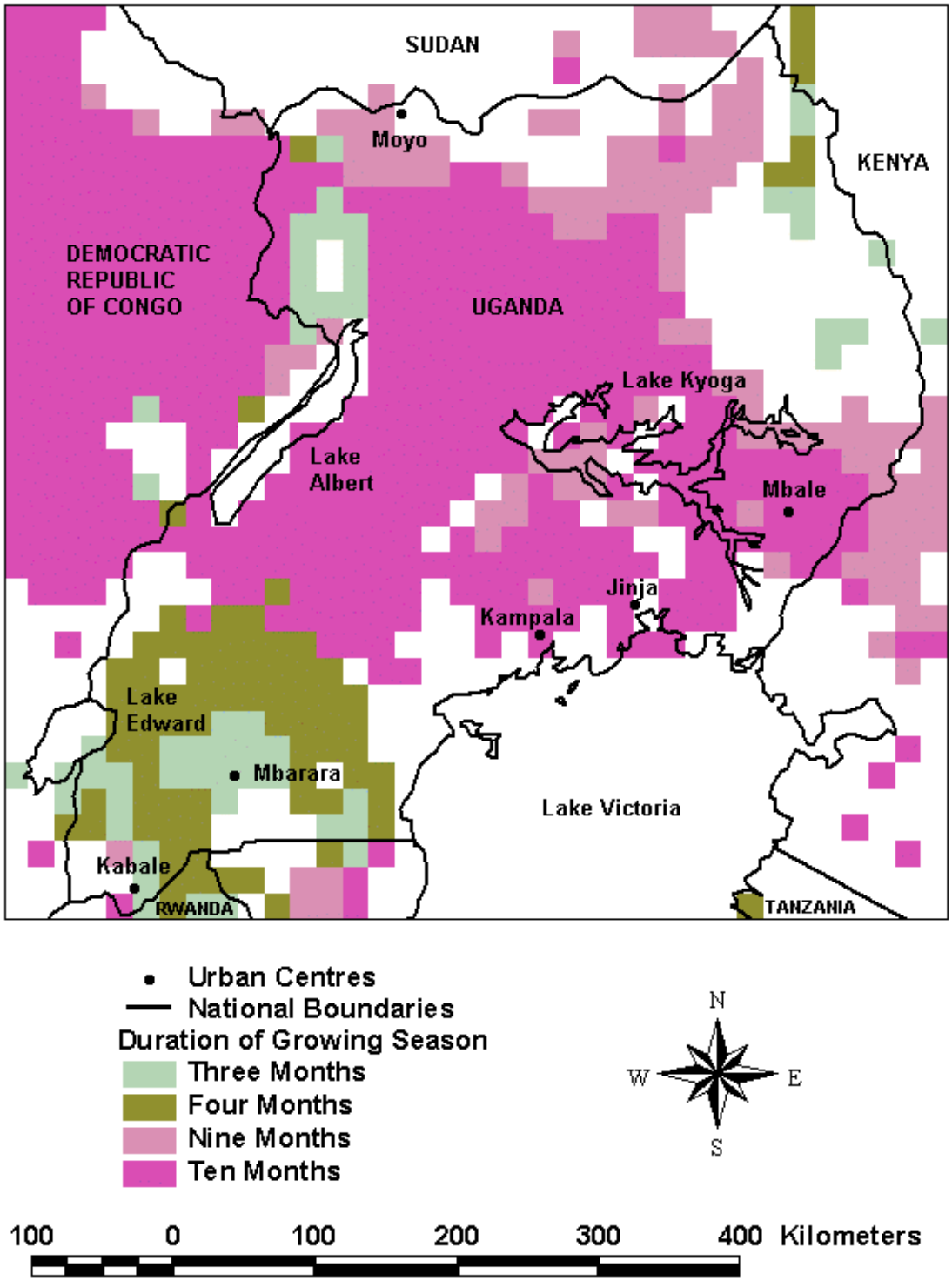
National Land Area 243,050 km^2

Production System Area 13,912 km^2



Map 27: Uganda – Length of Growing Season

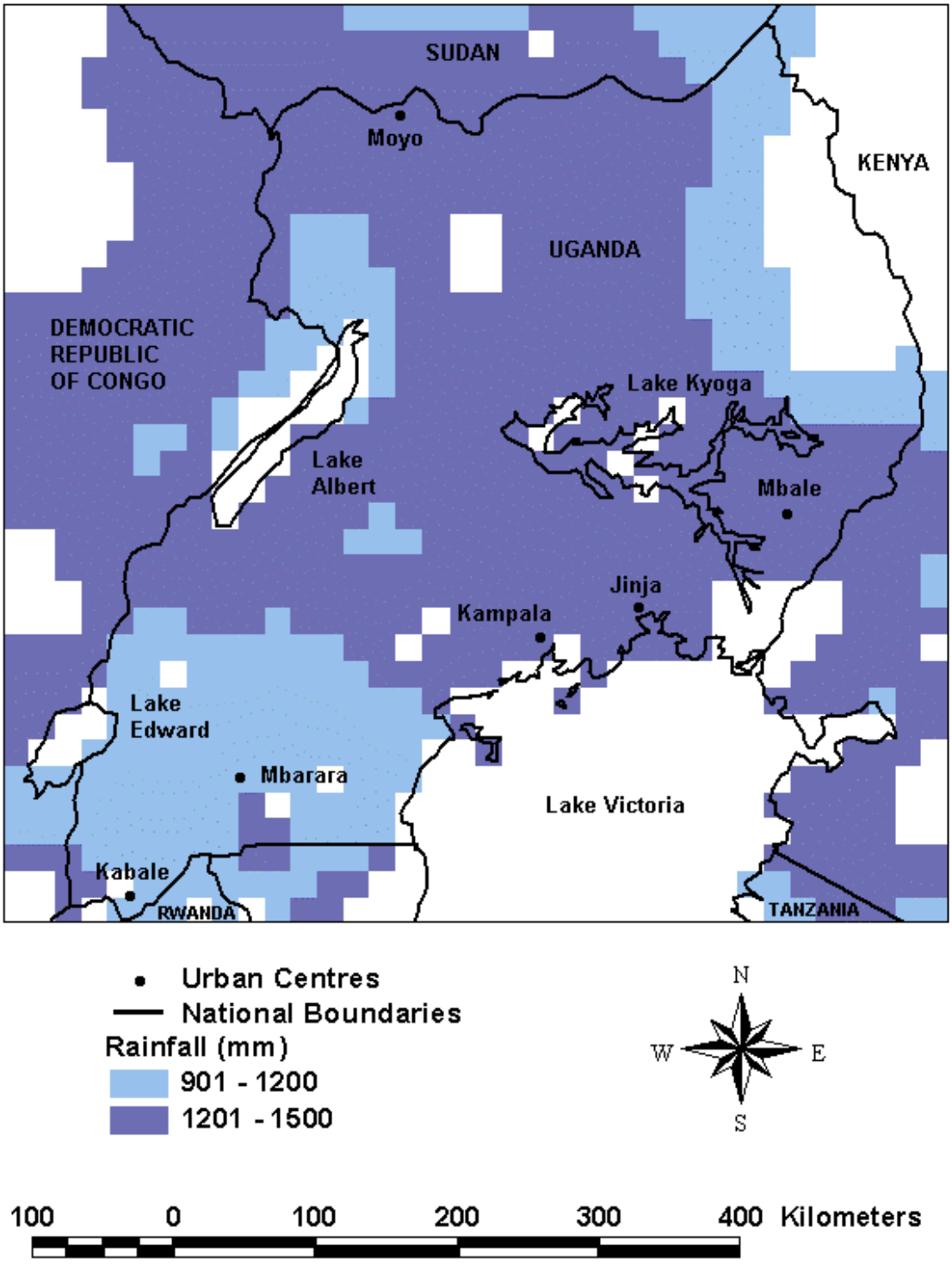
National Land Area 243,050 km^2



Map 28: Uganda – Annual Rainfall

Range 900 mm to 1500 mm

National Land Area 243,050 km^2



5.15 UGANDA

Production System – Land Water Interface

Based on 50 km distance from Lake Kyoga. LGP in this area is mainly 9-10 months and annual rainfall is mainly more than 1200 mm except for the easterly side where it falls to 900-1200 mm. A wider definition was considered (Scenario 2) but rejected on the basis that Uganda was not yet in the LWI portfolio and a narrow definition (based on expressed national demand) was appropriate.

Land Area	Area mapped using ArcView which calculated area in km_.
Population	Target area closely approximates the administrative districts of: Rakai, Masaka, Mpigi, Luwero, Apac, Lira, Soroti, Kumi, Tororo, Iganga, Kamuli, Jinja, Mukono and Kampala. 1990 population totals were obtained for these districts and increased by 25% to reflect the increase in the total Uganda population between 1990 and the 1998 UN estimate (see Table 5.10). Population density was based on the calculated total of 10,578,750 in 54,407 km_, resulting in 194 persons per km_.
Road Density	Estimated density of roads in target area using International Travel Maps: Uganda. Scale used: 5 = dense, 1 = sparse.
Demand Side Assessment	Data for main towns in target area were not available, however it was assumed that those shown in the Times Atlas are significant relative to the target area and in the main they are the regional administrative centres.
Assessment of Export Potential	Thirteen towns have been selected for this analysis and it is estimated that it is a maximum of 60 km to the nearest main town. This does not account for the condition of the transport infrastructure.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. The assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report*, and WHO website.
NR Knowledge Base	Data for degree level of national researchers obtained from ISNAR website. Number of agricultural research scientists and percentage of GDP allocated to agricultural research not available.

Table 5.10 Administrative District Population, Uganda

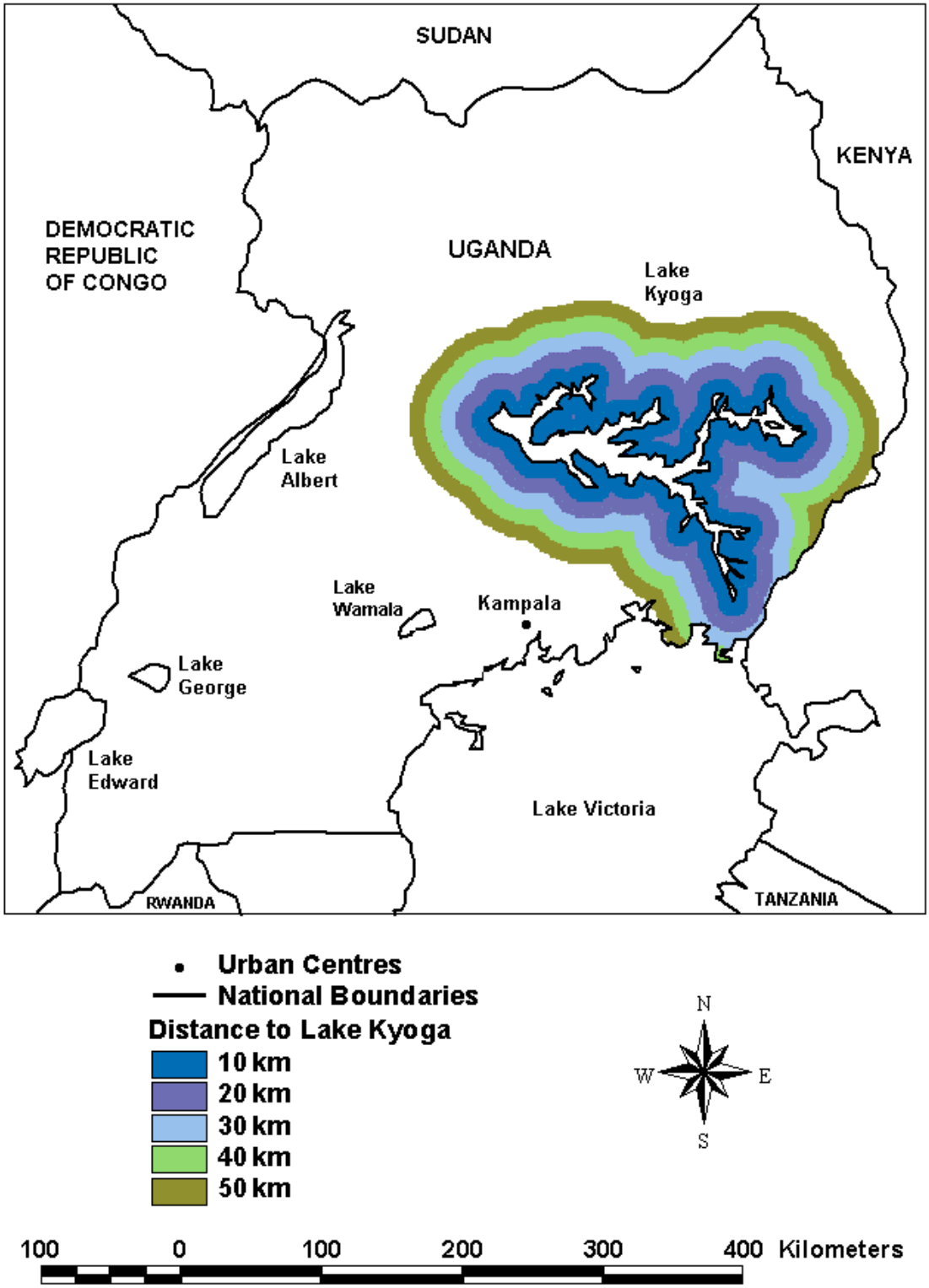
District	1990 Population	Plus 25%
Apac	432,000	540,000
Iganga	878,000	1,097,500
Jinja	271,000	338,750
Kamuli	449,000	561,250
Kampala	651,000	813,750
Kumi	306,000	382,500
Lira	498,000	622,500
Luwero	545,000	681,250
Masaka	849,000	1,061,250
Mpigi	840,000	1,050,000
Mukono	771,000	963,750
Rakai	396,000	495,000
Soroti	612,000	765,000
Tororo	965,000	1,206,250

Map 29: Uganda – Land Water Interface, Scenario 1

50 Kilometre Distance to Lake Kyoga

National Land Area 243,050 km^2

Production System Area 49,535 km^2

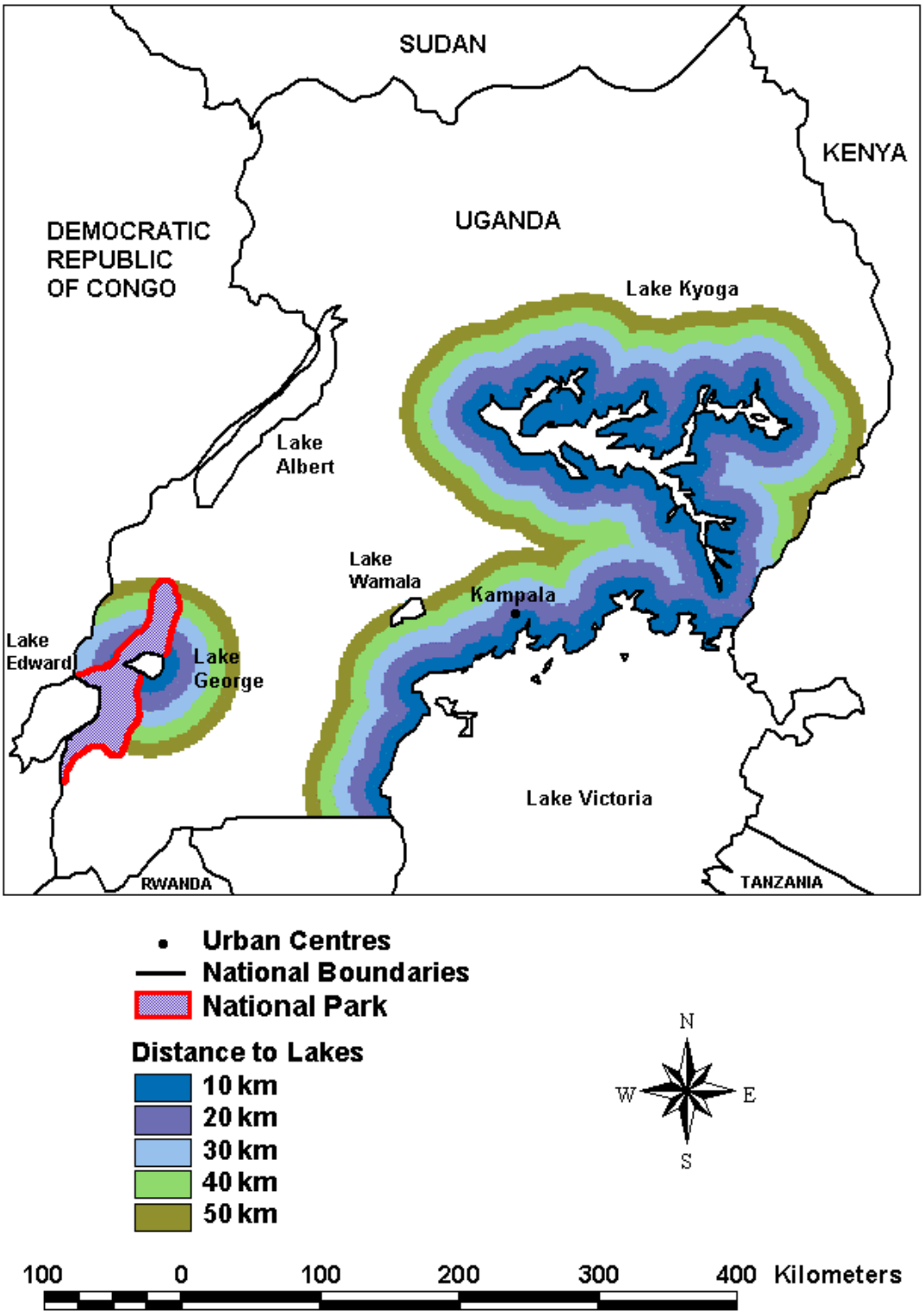


Map 30: Uganda – Land Water Interface, Scenario 2

50 Kilometre Distance to Lakes

National Land Area 243,050 km^2

Production System Area 75,477 km^2



5.16 ZIMBABWE

Production System – Semi-Arid

Based on 3-5 month LGP. The annual rainfall range of 300-1200 mm (to compare with the DFID definition of SA as 400-1200 mm) occupies the whole country. Similarly, taking a narrower rainfall definition (300-600 mm) failed to include the arid western zone around Bulawayo and Victoria Falls. Widening the range to 300-900mm covered the entire country except the Eastern Highlands, which also equates to the 3-6 month LGP. The target zone of 3-5 months LGP covers roughly half of the country: south and west and shores of Lake Kariba, covering Matabeleland North and South, most of Masvingo , Midland provinces and small parts of Mashonaland and Manicaland.

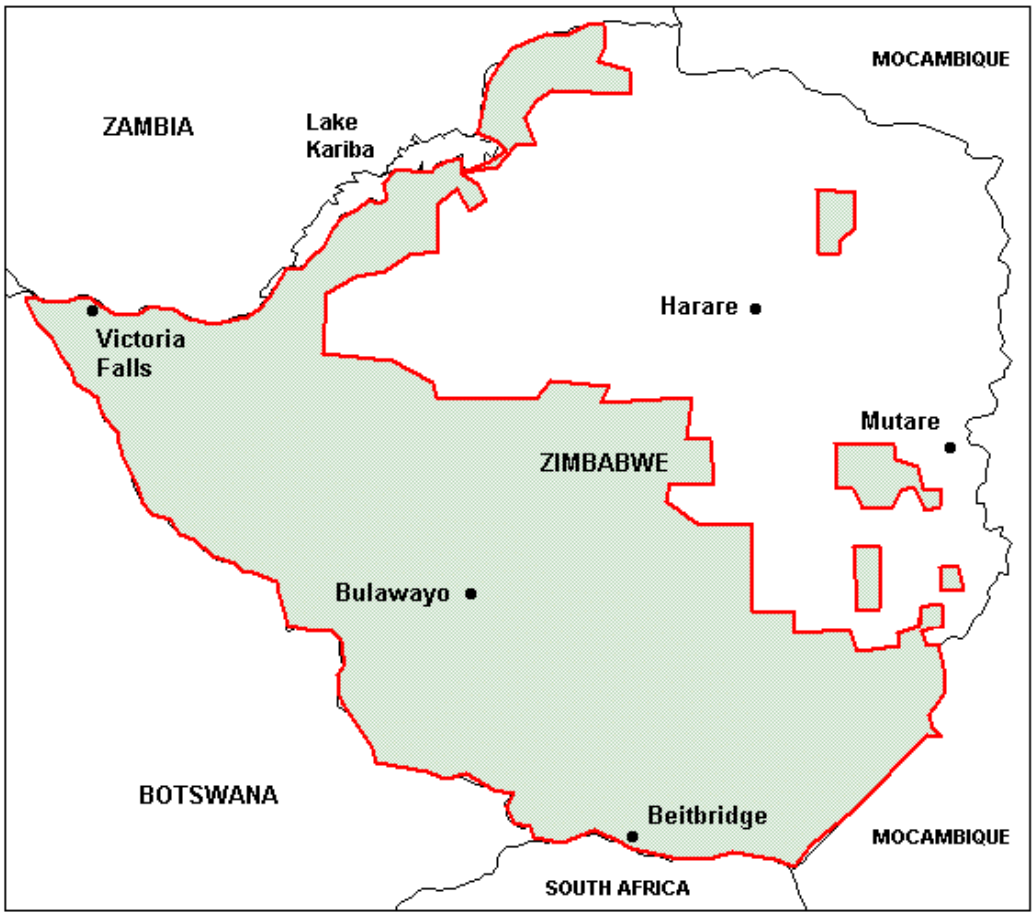
Land Area	Area mapped using ArcView, calculated in km_.
Population	Calculated taking an average population density for the target area of 25 persons per km_ in the absence of detailed provincial data. This assessment is based on 1997 FAO population density data showing the eastern provinces of Matabeleland to have a density of 11 to 20 persons per km_, Mashonaland West and Midlands with 20 to 29 per km_ and Masvingo with 33 to 45 per km_. As 75% of the target area falls within Matabeleland a conservative estimate was made.
Road Density	Estimated density of roads in target area using International Travel Maps: Zimbabwe. Scale used; 5 = dense, 1 = sparse.
Demand Side Assessment	Data on major towns in target area not available: based on those shown in bold type in Times Atlas.
Assessment of Export Potential	Estimated 150 km maximum distance to one of these towns.
Land Productivity Potential	A value on a five point scale according to the percentage of agricultural production for key products contributed by the target area has been applied, where: 5 = 80-100%, 4 = 60-80%, 3 = 40-60%, 2 = 20-40% and 1 = 0-20%. This judgement was made using crop zone data and maps from the FAO/GIEWS website. The assessment does not include tourism.
Poverty Status	National data obtained from UNDP *Human Development Report*, and WHO website.
NR Knowledge Base	Data for degree level of national researchers, number of agricultural research scientists and percentage of GDP allocated to agricultural research obtained from ISNAR website.

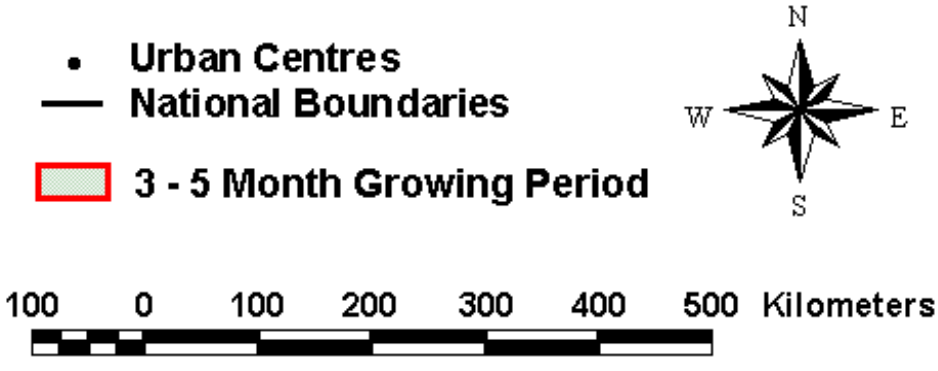
Map 31: Zimbabwe – Semi-Arid, Scenario 1

Length of Growing Period 3 to 5 Months

National Land Area 390,803 km^2

Production System Area 229,790 km^2





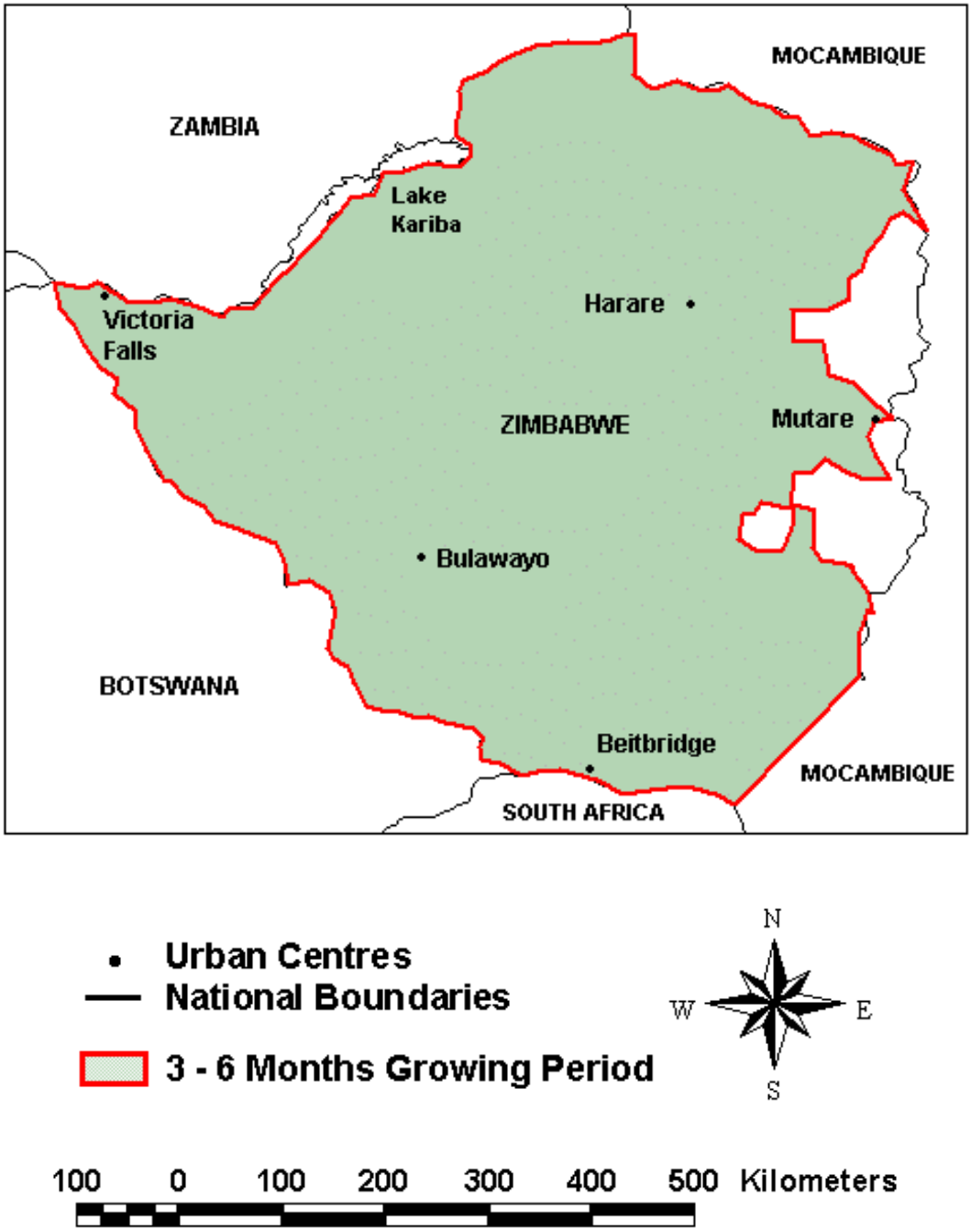
Note: This Map was based on the length of growing period by ICRISAT

Map 32: Zimbabwe – Semi-Arid, Scenario 2

Length of Growing Period 3 to 6 Months

National Land Area 390,803 km^2

Production System Area 384,429 km^2



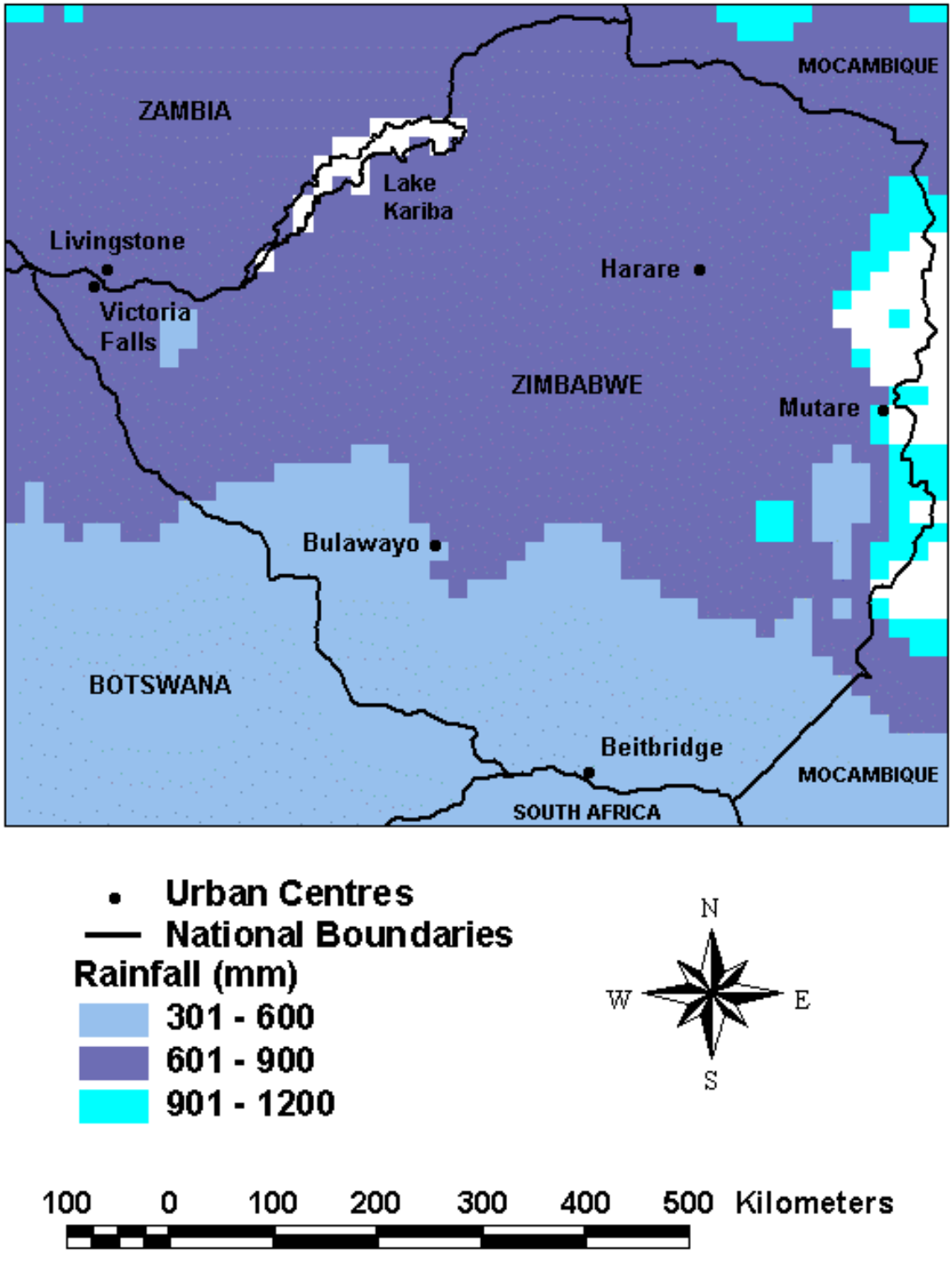
Note: This Map was based on the length of growing period by ICRISAT

Map 33: Zimbabwe – Annual Rainfall

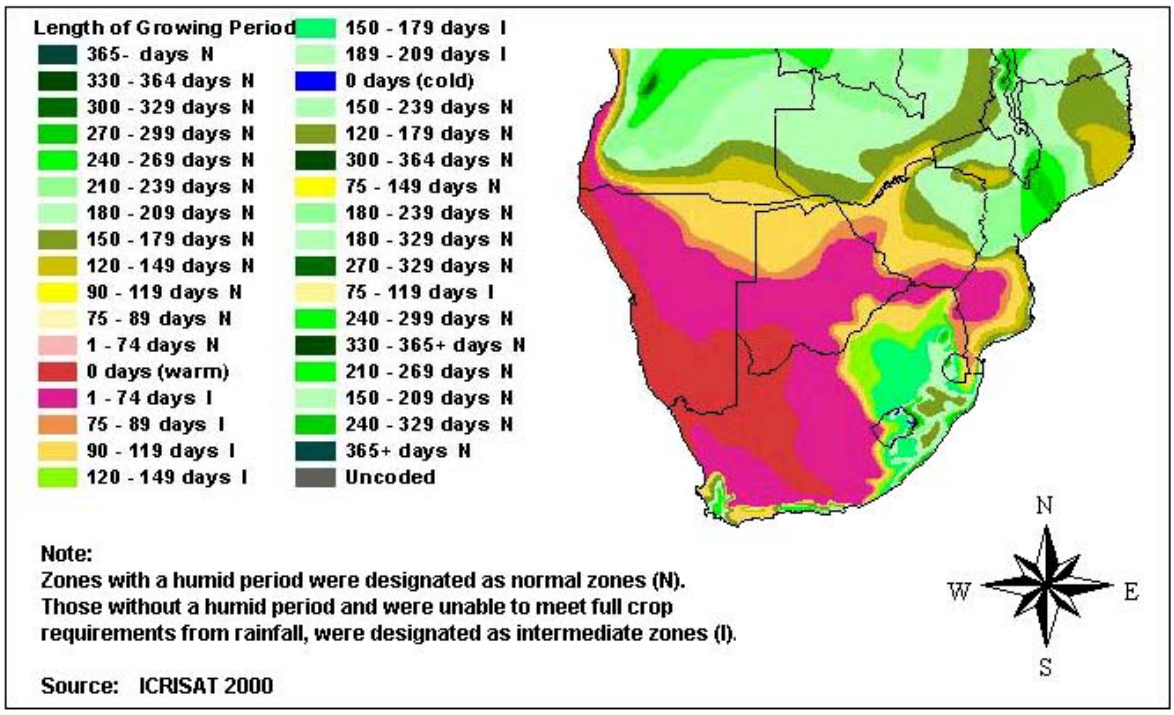
Range 300 mm to 1200 mm

National Land Area 390,803 km^2

Production System Area 387,929 km^2



Map 34: Southern Africa – Length of Growing Period



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APPENDICES

APPENDICES CONTENTS

[13] / The specific Production Systems for each Target Country are identified with a red-filled column header cell.

NOTES ON APPENDICES

APPENDIX 1 – TARGET COUNTRY PS CHARACTERISTICS

The basic data and information for the characterisation criteria were assembled in one Excel Workbook with sheets assigned for each Target Country and their specified Production Systems (PSs) (see Appendix 1, pages App-5 to App-16 and supplementary sheets App-17 to App-21).

As explained in the main text (Section 3), the PSs are not rigid entities and determining their extent in terms of land area is dependent on what limits (e.g., for rainfall, length of growing period, and/or soil type) are applied. In some countries more than one definition of a specific PS was considered. Data and information were assembled for these alternatives, designated in parenthesis (1), (2) etc. When data and information were combined for a specific PS across the relevant target countries, these options were taken forward, leading to three possible versions for comparisons between PSs, as summarised in the table below.

The combined data and information for each PS definition that was considered are summarised in one PS Master Summary Sheet (see Appendix 1, page App-4).

Versions	Production Systems					
Version 1	**HP(1)**	**HS**	**SA(1)**	**FA(2)**	**LW(1)**	**PU**
Version 2	**HP(2)**	**HS**	**SA(2)**	**FA(1)**	**LW(2)**	**PU**
Version 3	**HP(1)**	**HS**	**SA(1)**	**FA(1)**	**LW(3)**	**PU**

The different production system definitions that were applied in making PS combinations across countries were:

HP(1) Uses narrower definition of the High Potential PS in India (keeping to land below 150 metres elevation) plus single definitions specific to Kenya and Bangladesh respectively.

HP(2) Uses wider definition of the High Potential PS in India (including land of 1-500 metres elevation) plus single definitions specific to Kenya and Bangladesh respectively.

HS Uses only one wider definition of the Hillsides PS for Bolivia (HS(3), see App-6) plus single definitions specific to Uganda and Nepal respectively. (Details of HS(1) and HS(2) are given for Bolivia on page App-6).

SA(1) Uses rainfall based definition of the Semi-Arid PS for Tanzania (300-900 mm rainfall) and takes areas defined as dry and moist semi-arid in India plus a single definition for Zimbabwe.

SA(2) Uses LGP based definition of Semi-Arid PS for Tanzania (3-6 months) and takes areas defined as dry and moist semi-arid and dry sub-humid in India plus a single definition for Zimbabwe.

FA(1) Uses land area with 9-10 months LGP plus single definitions specific to Brazil and Nepal respectively.

FA(2) Uses land area with 8 months LGP plus single definitions specific to Brazil and Nepal respectively.

LW(1) Inland definition: Uses seasonally wetland areas of Bangladesh inland floodplains and Lake Kyoga margins with its drainage line into Lake Victoria, Uganda.

LW(2) Definition best aligned with current LW geographic scope: Uses Bangladesh (inland and coastal) and selected parts of the Caribbean region.

LW(3) Takes only the Bangladesh LWI (inland floodplains and coastal tidal floodplains).

PU Uses selected city regions of Ghana and India

APPENDIX 2 – SIMPLE SCORING

This annex utilises the summated data in the PS Master Summary Sheet of Appendix 1 (see page App-4) and generates data matrices of criteria by PSs for each version of the PS comparisons, as defined in the table above (see page App-2). Within each PS version (see pages App-22 to App-24), the values for each criterion are ranked across the PSs by scoring the values on a scale of 1 to 6 where:

6 = Greatest need (largest land area; most people; worst market feasibility [least roads & large towns]; worst potential [greatest distance to major outlets & least production]; most acute poverty status [lowest GDP, literacy rate & child wt for ht]; weakest NR knowledge base [least funds and human resources)

Grading to: ⇩

1 = Least need (smallest land area; least people; best market feasibility; best potential; least acute poverty status; strongest NR knowledge base)

For each PS comparison version, the rank scores (called 'simple scoring') for each criterion are converted to weighted scores for five weighting scenarios and a total weighted simple score is generated for each PS and each weighting scenario (see App-25 to App-27) where each total weighted simple score (the Weighted Importance Score [WIS]) is calculated as:

$$WIS = ([score]x[weight]_{Criterion\ 1}) + ([score]x[weight]_{Criterion\ 2}) \ldots + (([score]x[weight]_{Criterion\ 6})$$

All weighted simple score totals (for three PS versions by five weighting scenarios) are then summarised and an overall assessment is made of the implications of these scores for proportional budget allocations to the PSs (see App-28).

APPENDIX 3 – RELATIVE SCORING

This annex uses the same data matrices as Appendix 2, App-22 to App-42, but ranks the data for each criterion using relative scoring. Because the simple scoring method assigns discrete rank scores (the 'need scale' of 1 to 6), it does not do justice to criterion data that have numerically close values. Therefore Appendix 3 applies a relative scoring system in which a score of '1' is assigned to the 'greatest need' figure (i.e., the criterion value looking across PSs that had scored the highest rank score on the 1-6 scale of need assessment). The criterion values for all other PSs are then expressed as a fraction relative to the criterion value of the PS scored as the 'greatest need' (see App-29 to App-31).

As with the simple scoring method, the proportional scores are then converted to weighted scores for the same five weighting scenarios used in Appendix 2 (see App-32 to App-34). The total weighted scores (three PS versions by five weighting scenarios) are then summarised and an overall assessment is made of the implications of the scores for proportional budget allocations to the PSs (see App-35).

APPENDIX 4 – RELATIVE SCORING (WITH CORRECTIONS FOR DOUBLE COUNTING)

Two production systems are addressed in the target countries of Bangladesh and Nepal (see Appendix 1, pages App-5 and App-13 respectively). This gives rise to double counting of the populations when comparing in the HP and LW PSs (in the case of Bangladesh) and the HS and FA PSs (in the case of Nepal). In Appendix 4, corrections are applied for this double counting and the scoring is then reworked following the relative scoring method that was applied in Appendix 3 (see pages App-36 to App-38). As in Appendix 3, the proportional scores are then converted to weighted scores for the five weighting scenarios used in Appendix 2 (see App-39 to App-41). As in Appendices 2 and 3, the total weighted scores are then summarised and an overall assessment is made of the implications of the scores for proportional budget allocations to the PSs (see App-42).

APPENDIX 1

PRODUCTION SYSTEMS CHARACTERISATION
MASTER SUMMARY SHEET

By Production System (PS) definition:	HP (1)	HP (2)	HS	SA (1)	SA (2)	FA (1)	FA (2)	LW (1)	LW(2)	LW (3)	PU
Land area (km^2)	521,307	695,117	278,927	1,505,332	2,242,353	386,480	374,472	153,362	187,483	124,149	
Human population: Total	268,165,453	348,324,325	18,234,520	337,144,820	551,169,257	22,558,595	17,661,448	88,410,065	103,181,200	98,055,200	42,846,239
Rural (metropolitan minus city pop'tn for PUI)	201,480,731	260,798,296	14,913,896	249,172,032	407,632,645	15,685,378	12,590,380	70,690,251	79,770,308	77,463,608	26,133,153
Urban	66,684,722	87,526,029	3,320,623	87,972,788	143,536,612	6,873,217	5,071,067	17,719,814	23,410,892	20,591,592	16,713,086
Market infrastructure:											
Mean road density	4.17	4.17	1.67	3.17	3.50	2.33	1.67	4.00	4.33	4.00	5.00
Mean market demand assessment (large towns/1000 sqkm of PS)	0.10	0.10	0.15	0.03	0.03	0.10	0.11	0.21	0.11	0.14	n/a
Potential:											
Assessment of export potential (mean max dist.to major town [km])	133.33	133.33	96.67	183.33	200.00	166.67	183.33	80.00	83.33	100.00	n/a
Land productivity potential (mean)	4.00	4.17	2.17		2.83	1.83	1.83	4.50	5.00	5.00	n/a
Poverty status (National data):											
Average GDP (USD per annum per capita,1997) (weighted)	1452	1502	1556	1653	1644	2157	2301	1050	1160	1050	1667
Literacy rate % (1997, weighted)	51.31	51.82	49.96	54.60	54.45	54.34	49.75	38.90	40.19	38.90	54.63
Harvard scale data:											
% children with acceptable weight/height (weighted)	56.30	55.77	63.42	55.40	55.46	60.27	55.78	57.00	58.01	57.00	53.38
NR knowledge base (National data):											
Degree level of national researchers (1991): % BSc						86.51	86.51				
Degree level of national researchers (1991): % MSc						9.06	9.06				
Degree level of national researchers (1991): % PhD						4.43	4.43				
% of GDP to Agricultural Research (1991) (weighted)	0.1539	0.1539		0.1545	0.1545	0.0961	0.0961				0.1529
NR Research Scientists (1991) per PS population	2491	2889		1885	3049	148	77				249
NR Research Scientists (1991) per 1m population of PS	10	9		6	6	7	4				6

Primary and secondary paved roads. Scale 5 = dense, 1 =sparse.

Uses narrower definition of India HP plus Kenya and Bangladesh.

Uses wider definition of India HP plus Kenya and Bangladesh.

Uses the wider definition of Bolivian HS plus Uganda and Nepal.

Uses narrower defintion of semi-arid for Tanzania and India plus Zimbabwe.

Uses wider semi-arid definition for India and Tanzania plus Zimbabwe.

Uses Ghana land area with 9 mths LGP plus Brazil and Nepal.

Uses Ghana land area with 8 mths LGP plus Brazil and Nepal.

LW as of mid-2000. Uses Bangladesh & Caribbean

Uses inland wetlands (Bangladesh & Uganda)

Uses Bangladesh only

Definition of 'large' is relative to the country.

data not available

too few data for meaningful calculation

'Real GDP per capita' from UNDP 1999. National data only.

Weighted averages by total human population per PS within each applicable target country.

No data for Tanzania

Scale: % contribution to national production: 5 = 80 - 100, 4 = 60 - 80, 3 = 40 - 60, 2 = 20 - 40, 1 = 0 -20 Key agricultural, forestry, tourism etc products.

No data for Tanzania.

No data for Nepal.

No data for Nepal.

No data for Nepal.

Based on weighted average for Ghana and Nepal only

Based on weighted average for Ghana and Nepal only.

No data for Nepal.

No data for Nepal.

No data for Nepal.

TARGET COUNTRY PS CHARACTERISTICS

Same area as LWI. Alluvial area supporting large population.

Same area as HP. The inland floodplain. Coastal tidal floodpalin & Chittagong region excluded. All land below 100m elevation. Livelihoods are predominately related to the LWI.

Coastal area -- the Ganges Tidal Floodplain (includes Kulna Sunderbans and saline areas of the Young Meghna River Floodplain.

Bangladesh Bureau of Statistics 1999 link http://www.bangla.net/ndb/data-sheet/DEMO_DATA.htm

BANGLADESH	HP	HS	SA	FA	LW (1)	LW (2)	PU	National	Source	Notes
National data:										
Land area (km2)			75% of total land area			75% of total land area.		138507	ESRI 98	Dhaka 3430312
Human population: Total						63.5% of total population to exclude Hill Tract region of Chittagong district and the coastal zone.		122569000	UN mid 98	Khulna 648359
Rural								96339234		Chittagong 1391877
Urban			63.5% of total population to exclude Hill Tract region of Chittagong district and the coastal zone.					26229766		
						79% of population according to HDR data.				HDR data 1999
PS data:										Nat pop 122700000
Land area (km2)	103827				103827	20322				%urban 21.4
Human population: Total	77831315				77831315	20223885		15% of total land area.		
Rural	61486739				61486739	15976869				ESRI 98 120732200
Urban	16344576		79% of population according to HDR data.		16344576	4247016		16.5% of total population		
Market infrastructure:										UN ESCAP 1981:
Road density (km roads per PS on 5 pt scale)	4				4	4				Chittagong Hill Tracts
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)	0.16373				0.16373	0.83653				region - 20% of pop
Assessment of export potential (mid point of PS to major city [km])	100		21% of population according to HDR data.		100	100		79% of population according to HDR data.		
Land productivity potential	5				5	5				
Poverty status: Average GDP (USD per annum per capita,1997)	1050				1050	1050		1050	UNDP1999	
Literacy rate % (1997, national)	38.9				38.9	38.9		38.9	UNDP1999	
Harvard scale data										
% children with aceptable weight/height to age	57		UN listed cities of >100,000: Barisal, Comilla, Dhaka, Dinajpur, Jamalpur, Jessore, Khulna, Mymensingh, Naogaon, Narayanganj, Nawabganj, Pabna, Rajshabi, Rangpur, Saidpur, Tangail, Tongi.		57	57		21% of population according to HDR data.		
NR knowledge base										
NR knowledge base (Degree level of national researchers) : % BSc						21% of population according to HDR data.				
% MSc										
% PhD										
Agricultural Research: No of scientists (1991)	1650				1650	1650				
Share of GDP to Ag R (1991)	0.11				0.11	0.11				
Calculations for weights on summary page: GDP	81722880750				81722880750	21235079250				
Lit	3027638154				3027638154	786709126.5				
Weight/height	4436384955				4436384955	1152761445				
GDP national	1.28697E+11				1.28697E+11	1.28697E+11				
GDP on Ag	141567195				141567195	141567195				
Sci per 1 million national population	13.46180519				13.46180519	13.46180519				
Sci per PS population	1047.75				1047.75	272.25				
Weighted degree BSc										
Weighted degree MSc										
Weighted degree PhD										

Road density scale: 5=dense, 1=sparse.

'Real GDP per capita' from UNDP 1999.

Adult literacy rate 1997 from UNDP 1999.

Height/weight only.

1991 data.

UN listed cities of >100,000: Barisal, Comilla, Dhaka, Dinajpur, Jamalpur, Jessore, Khulna, Mymensingh, Naogaon, Narayanganj, Nawabganj, Pabna, Rajshabi, Rangpur, Saidpur, Tangail, Tongi.

UN listed cities of >100,000: Barisal, Comilla, Dhaka, Dinajpur, Jamalpur, Jessore, Khulna, Mymensingh, Naogaon, Narayanganj, Nawabganj, Pabna, Rajshabi, Rangpur, Saidpur, Tangail, Tongi.

APPENDIX 1

TARGET COUNTRY PS CHARACTERISTICS

Sub-system 1: 1000-2000m altitude. Subtropical valleys. Rainfall 1000-3000mm

Sub-system 2 : 2000-3500m altitude. Temperate valleys. Rainfall 400-1000mm.

System 3: 1000-3500m altitude. Valley AEZ as distinct from the lowlands and the altiplano. Sum of sub-systems 1 & 2.

BOLIVIA	HP	HS (1)	HS (2)	HS (3)	SA	FA	LW	PU	National	Source	Notes
National data:											
Land area (km2)									1090353	ESRI 98	
Human population: Total									7950000	UN mid 98	
Rural									2997150		
Urban									4952850		
PS data:											
Land area (km2)		77891	105694	183585							
Human population: Total				4213500							
Rural				2464500							
Urban				1749000							
Market infrastructure:											
Road density (km roads per PS on 5 pt scale)		1	2	3							
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)			0.05677	0.03268							
Assessment of export potential (mid point of PS to major city [km])		150	150	150							
Land productivity potential				2							
Poverty status: Average GDP (USD per annum per capita,1997)		2880	2880	2880					2880	UNDP1999	
Literacy rate % (1997, national)		83.6	83.6	83.6					83.6	UNDP1999	
Harvard scale data											
% children with acceptable weight/height to age		93	93	93							
NR knowledge base											
NR knowledge base (Degree level of national researchers) : % BSc		17.4	17.4	17.4							
% MSc		54	54	54					0.4		
% PhD		28.6	28.6	28.6							
Agricultural Research: No of scientists (1991)		115	115	115							
Share of GDP to Ag R (1991)		0.02	0.02	0.02							
Calculations for weights on summary page: GDP				12134880000							
Lit				352248600							
Weight/heoght				391855500							
GDP national				22896000000							
GDP on Ag				4579200							
Sci per 1 million national population				14.46540881							
Sci per PS population				60.95							
Weighted degree BSc				20.01							
Weighted degree MSc				62.1							
Weighted degree PhD				32.89							

7% of total land area

10% of total land area.

17% of total land area. Compare with CID data giving 213287 sq km and 19% of land area for this zone.

Road density scale: 5=dense, 1=sparse.

'Real GDP per capita' from UNDP 1999.

No major towns in target area.

53% of total population. (1994 CID data) applied to 1998 UN estimate for total population.

31% of total population. (1994 CID data) applied to UN data.

Adult literacy rate 1997 from UNDP 1999.

22% of total population. (1994 CID data) applied to UN data.

Major towns in target area: Cochabamba, La Paz, Potosi, Santa Cruz, Sucre, Tarija.

Major towns in target area: Cochabamba, La Paz, Potosi, Santa Cruz, Sucre, Tarija.

Notes					
La Paz	992592	Cochabamb	458000	Potosi	118000
Sucre	149000	El Alto	527000	Tarija	104000
S Cruz	833000	Oruro	194000		

Valleys temperate and subtropical 1000-3500m
213287km2 19.4% of land area
3428069 pop 53.4% of total
2020811 urban 31.4% of total
1407258 rural 21.9% of total
Source: CID in

CID data (1994):

Total pop	6420792
Urban pop	3694846
Rural pop	2725946

HDR data 1999

Nat pop	7800000
%urban	62.3

ESRI 98 7648315

APPENDIX 1

TARGET COUNTRY PS CHARACTERISTICS

Eastern Amazionia from Belem to Manaus.
Lowland corridor along Amazon and tributaries.
Interaction of temperature, elevation and agricultural activity.
Lowland forest clearance zone.

BRAZIL	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)							8507128	ESRI 98
Human population: Total					3% of total land area.		161790000	UN mid 98
Rural							33005160	
Urban							128784840	
PS data:								
Land area (km2)				237927				
Human population: Total				3769698				
Rural				713781				
Urban				3055917				
Market infrastructure:								
Road density (km roads per PS on 5 pt scale)				1				
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)				0.02522				
Assessment of export potential (mid point of PS to major city [km])				300				
Land productivity potential				1				
Poverty status: Average GDP (USD per annum per capita,1997)				6480			6480	UNDP1999
Literacy rate % (1997, national)				84			84	UNDP1999
Harvard scale data								
% children with acceptable weight/height to age								
NR knowledge base								
NR knowledge base (Degree level of national researchers) : % BSc				94			22	
% MSc				4.3			0.2	
% PhD				1.7				
Agricultural Research: No of scientists (1991)				2097				
Share of GDP to Ag R (1991)				0.09				
Calculations for weights on summary page: GDP				24427643040				
Lit				316654632				
Weight/height				0				
GDP national				1.0484E+12				
GDP on Ag				943559280				
Sci per 1 million national population				12.96124606				
Sci per PS population				48.85998335				
Weighted degree BSc				1971.18				
Weighted degree MSc				90.171				
Weighted degree PhD				35.649				

Total of estimated rural and urban populations.
2% of total population.

Road density scale:
5=dense, 1=sparse.

Based on population density of 3 people per sq km for target area.

'Real GDP per capita' from UNDP 1999.

Adult literacy rate 1997 from UNDP 1999.

Based on total of UN data for cities with more than 100,000 inhabitants: Belem, Manaus, Santarem, Itaituba, Altamira and Macapa.

1991 data.

Towns >100,000 in target area: Altamira, Belem, Itaituba, Macapa, Manaus, Santarem.

Notes

Belem	1200000	
Santarem	226618	
Manaus	809914	
Porto Velho	202011	
Cuiaba	279651	
Goiania	990000	
Brasilia	1567709	
Curitiba	1700000	
Sao Paulo	15175000	
Belo Horizo	2950000	
Rio de Jane	10150000	
Santos	1065000	
HDR data 1999		
Nat pop	163700000	
%urban	79.6	
ESRI 98	151525400	
Pop of states 1990 EIU		Target area
Rondonia	8893	3 per sqkm
Acre	1096	713781
Amazonas	417	plus cities
Roraima	2002	
Para	120	
Amapa	5002	
Cities	1993 UN	
Belem	1297592	
manaus	1078277	
Careiro		
Santarem	277482	
Itaituba	102852	
Altamira	120441	
Macapa	179273	
Tot	3055917	

APPENDIX 1

TARGET COUNTRY PS CHARACTERISTICS

Various definitions of Caribbean: ie small islands of the CARIFORUM countries, CARICOM plus UK dependencies.
Definition used is the latter but excluding the CARICOM members Bahamas, Haiti and Suriname.
The countries/states/territories included here are therefore:Anguilla, Antigua & Barbuda, Barbados, BVI, Cayman Is., Dominica, Grenada, Guyana, Jamaica, Montserrat, St Kitts & Nevis, St Lucia, St Vincent & the Grenadines, Trinidad & Tobago, Turks & Caicos Is.

Target area: all of islands and coastal zone of mainland Guyana.

Data from NRSP R7111.

Data from NRSP R7111.

CARIBBEAN	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)							258270	
Human population: Total							5701000	
Rural								
Urban								
PS data:								
Land area (km2)					63334			
Human population: Total					5126000			
Rural					2306700			
Urban					2819300			
Market infrastructure:								
Road density (km roads per sqkm of PS on 5 pt scale)					5			
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)					0.04737			
Assessment of export potential (mid point of PS to major city [km])					50			
Land productivity potential					5			
Poverty status: Average GDP (USD per annum per capita,1997)					4869		4869	
Literacy rate % (1997, national)					83.4		83.4	
Harvard scale data								
% children with acceptable weight/height to age					92			
NR knowledge base								
NR knowledge base (Degree level of national researchers) : % BSc								
% MSc								
% PhD								
Agricultural Research: No of scientists (1991)								
Share of GDP to Ag R (1991)								
Calculations for weights on summary page: GDP					24958494000			
Lit					427508400			
Weight/height					471592000			

Total for target countries minus 80% of Guyana land area.

Total for target countries minus 50% of Guyana population.

'Real GDP per capita' from UNDP 1999.

Average 55% urban for target countries for which data is available.

Adult literacy rate 1997 from UNDP 1999.

Towns >100,000 in target area: Georgetown, Kingston, Port of Spain. Size of main towns vary according to the size of the island. This value is very distorted by the land area from mainland Guyana.

Km of roads (all classes) for target countries per sqkm. Care, figure includes total roads for Guyana but target area only includes coastal zones.
Figure of 44,542km of roads used. 5 on scale

Data only available for:
Dominica 90%
Grenada 98%
Jamaica 93%
Trinidad & Tobago 90%
Average taken for Jamaica and T&T only because of relative population size.

100km for coastal Guyana, 50km for Jamaica. 10-25km for small islands.

1991 data.

Weighted average for GDP data available (independent states only).

Based on simple average of adult literacy data available (independent states only).

Notes
CARE
Use DFID definition of Caribbean??
From DFID-RNRRS-NRSP Report R7111
LWI Production Systems: Source CIA World Factbook 1996

State	Area (km2)	Pop	Roads	Paved	Not paved
Anguilla	91	10000	105	65	40
Antigua & I	440	66000	250		
Barbados	430	257000	1650	1582	68
BVI	150	13000	113		
Cayman Is	260	35000	406	304	102
Dominica	750	83000	780	393	387
Grenada	340	95000	1040	638	402
Guyana	214970	712000	7970	590	7980
Jamaica	10990	2595000	18700	13100	5600
Montserrat	100	13000	269	203	66
St K & N	269	41000	320	136	184
St Lucia	620	158000	1210	63	1147
St V & G	340	118000	1040	320	720
T & T	5130	1272000	8320	4252	4068
Turks & C	430	14000	121	24	97
Sub total	235310	5482000	42294		
Guyana ad	171976	356000			
Total	63334	5126000			
Kingston	700k				
Georgetow	200k				
P of Spain					

50%

20%

Weighted average for GDP data available (independent states only).

Based on simple average of adult literacy data available (independent states only)

TARGET COUNTRY PS CHARACTERISTICS

Based on percentage of land area occupying target area. Population figures from provincial 1984 data increased by 55% to reflect national population growth 1984-98. 36% of total population.

Based on LGP of 9 mths. Selects area where climax vegetation is forest, that has been/is variously cleared for agriculture.

Based on LGP of 8 mths. Selects the ecological transition zone from savanna to forest as the climax vegetation cover, both variously cleared and used for agriculture.

Accra Kumasi Tamale Tema Sekondi-Takoradi

Based on percentage of land area occupying target area. Population figure from provincial 1984 data increased by 55% to reflect growth in national population 1984-98. 10% of total population.

GHANA	HP	HS	SA	FA (1)	FA (2)	LW	PU	National	Source
National data:									
Land area (km2)								239981	ESRI 98
Human population: Total								19162000	UN mid 98
Rural								12110384	
Urban								7051616	
PS data:									
Land area (km2)				67123	55115				
Human population: Total				6831315	1934168		3768000		
Rural				4317391	1222394		1280889		
Urban				2513924	711774		2487111		
Market infrastructure:									
Road density (km roads per sqkm of PS on 5 pt scale)				5	3		5		
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)				0.14898	0.18144				
Assessment of export potential (mid point of PS to major town [km])				100	150				
Land productivity potential				1	1				
Poverty status: Average GDP (USD per annum per capita,1997)				1640	1640		1640	1640	UNDP1999
Literacy rate % (1997, national)				66.4	66.4		66.4	66.4	UNDP1999
Harvard scale data									
% children with acceptable weight/height to age				73	73		47		
NR knowledge base (Degree level of national researchers) : % BSc				30	30		30		
% MSc				45	45		45		
% PhD				25	25		25		
Agricultural Research: No of scientists (1991)				278	278		278		
Share of GDP to Ag R (1991)				0.3	0.3		0.3		
Calculations for weights on summary page: GDP				11203356600	3172034700		6179520000		
Lit				453599316	128428722		250195200		
Wieght/height				498685995	141194227.5		177096000		
GDP national				31425680000	31425680000		31425680000		
GDP on Ag				94277040	94277040		94277040		
Sci per 1 million national population				14.50788018	14.50788018		14.50788018		
Sci per PS population				99.10789949	28.06067034		54.66569252		
Weighted degree BSc				83.4	83.4		83.4		
Weighted degree MSc				125.1	125.1		125.1		
Weighted degree PhD				69.5	69.5		69.5		

Primary and secondary paved roads. Scale 5 = dense, 1=sparse.

23% of land area.

28% of land area.

Scale: % contribution to national production: 5 = 80 - 100
4 = 60 -80
3 = 40 -60
2 = 20 - 40
1 = 0 -20

'Real GDP per capita' from UNDP 1999.

Adult literacy rate 1997 from UNDP 1999.

1993 data - weight/age only.

1991 data.

Major towns in target area: Kumasi, Sunyani, Obusai, Bakwai, Ho, Berekum, Gawso, Bakwai, Hahoe, Kpandu.

36.8% based on national data. HDR 1999

Towns in target area: Salaga, Kintampo, Yendi, Bimbila, Dunbai, Kete Krachi, Kwadjokrom, Yeji, Bole, Sawla.

Accra, Kumasi, Sekondi-Takoradi, Tamale, Tema. 1984 census data increased by 55% or 1998 estimates from FWKC encyclopedia. 20% of population.

Difference between city and metropolitan populations = peri-urban.

1984 census 'city' data scaled up by 55% to reflect general population increase.

Notes

www.un.org/Depts/unsd/demog/288.htm
1970 data

Accra 1.250,000
UN data 1970 50%
Accra 564194(783498)
Kumasi 260286(345117)
Sekondi 91874(160868)

HDR Data 1999
Nat pop 1870000
%urban 36.8

ESRI 98 16698090

Europa 1984 data		Scenario 1		Scenario 2	
Western	1158				
Central	1142				
G Accra	1431				
Eastern	1681	30%	504.3		
Volta	1212	50%	606	30%	363.6
Ashanti	2090	100%	2090		
Brog-Ahafo	1207	100%	1207	25%	301.75
Northern	1165			50%	582.5
Upper E	773				
Upper W	438				
Total	12297		4407.3		1247.85
plus55%	19060.35		6831.315		1934.168

Targets for PUI

	city 84	plus 55%	metro 98	
Accra	867459	1344561	2218000	unable to find
Kumasi	376249	583186	700000	estimate for Accra
Tamale	135952	210725.6	300000	figure is increased
Tema	131528	203868.4	250000	1984 Greater Accra
Takoradi}	61484	95300.2	300000	data
Sekondi}	31916	49469.8		
	1604588	2487111	3768000	
plus55%	2487111.4			

TARGET COUNTRY PS CHARACTERISTICS

Indo-gangetic plain zone. Low elevation Bihar & Eastern UP, higher elevation western UP, Haryana & Punjab. Interaction of soil type and rainfall

Indo-gangetic plain zone. Low elevation Bihar & eastern UP.

Interaction of rainfall, soils, elevation. Dry and moist semi arid: LGPs 90-150 days, 500-1000mm. Based on ICRISAT LGP NRM Programme data.

Interaction of rainfall, soils, elevation. As for Scenario 1 plus: Dry sub humid: LGP 150-180 days, 1000-1200mm. Based on ICRISAT LGP NRM Programme data.

Suggested approach was to select 2 'mega', 2 large, 2 medium and 2 small cities. Analysis of the 1991 census data shows that there were 300 cities with population greater than 100,000 accounting for 217 million of India's people. Cities selected: Agra, Bangalore, Bombay, Calcutta, Kharagpur, Hyderabad, Hubli-Dharwad and Shillong.

INDIA		HP(1)	HP(2)	HS	SA (1)	SA (2)	FA	LW	PU	National	Source
National data:											
Land area (km2)										3089282	ESRI 98
Human population: Total										970933000	UN mid 98
	Rural									704897358	
	Urban									266035642	
PS data:											
Land area (km2)		309929	483739		1027260	1620487					
Human population: Total		169002378	249161250		322700313	528471738			39078238.98		
	Rural	125061760	184379325		238798232	391069086			24852264		
	Urban	43940618	64781925		83902081	137402652			14225975		
Market infrastructure:											
Road density (km roads per PS on 5 pt scale)		5	5		4	5			5		
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)		0.01936	0.02067		0.01655	0.01913					
Assessment of export potential (mid point of PS to major city [km])		200	200		200	200					
Land productivity potential		3	3.5			3					
Poverty status: Average GDP (USD per annum per capita,1997)		1670	1670		1670	1670			1670	1670	UNDP1999
Literacy rate % (1997, national)		53.5	53.5		53.5	53.5			53.5	53.5	UNDP1999
Harvard scale data											
% children with acceptable weight/height to age		54	54		54	54			54		
NR knowledge base											
NR knowledge base (Degree level of national researchers) : % BSc											
	% MSc										
	% PhD									0.3	
Agricultural Research: No of scientists (1991)		4830	4830		4830	4830			4830		
Share of GDP to Ag R (1991)		0.15	0.15		0.15	0.15			0.15		
Calculations for weights on summary page: GDP		2.82234E+11	4.16099E+11		5.3891E+11	8.82548E+11			65260659097		
	Lit	9041627223	13330126875		17264466746	28273237983			2090685785		
	Weight/height	9126128412	13454707500		17425816902	28537473852			2110224905		
GDP national		1.62146E+12	1.62146E+12		1.62146E+12	1.62146E+12			1.62146E+12		
GDP on Ag		2432187165	2432187165		2432187165	2432187165			2432187165		
Sci per 1 million national population		4.974596599	4.974596599		4.974596599	4.974596599			4.974596599		
Sci per PS population		840.7186549	1239.476707		1605.30388	2628.933711			194.3984747		
Weighted degree BSc											
Weighted degree MSc											
Weighted degree PhD											

Road density scale: 5=dense, 1=sparse.

'Real GDP per capita' from UNDP 1999.

Adult literacy rate 1997 from UNDP 1999.

Weight/age only.

Based on 75% of population of Bihar and 60% of Uttar Pradesh, increased by 14% to reflect population increase in 1991 census data. 17% of total population.

74% rural from national statistics. Area includes cities of Patna, Benares, Gorakpur, Lucknow, Allahabad and Kanpur.

Based on 75% of population Bihar, 80% of UP, 90% of Haryana, 90% of Punjab and 100% of Delhi UT. Increased by 14% to reflect general increase in population. 26% of total population.

Based on approximate percentage of state land falling with the target area and applying the same percentage to the 1991 state census data. The total was then increased to reflect the difference between the 1991 census data and the UN mid 1998 estimate. 54% of total population.

74%, from national data. See notes for individual state rural/urban data

74%, from national data. Refer to notes for indivdual state rural/ urban data.

Wider definition target area includes additional cities: Allahabad, Bareilly, Benares, Bhopal, Bombay, Chandigargh, Gorakhpur, Hyderabad, Madras, Nagpur, Patna, Pune, Surat, Varanasi.

Based on approx. % of state land area falling within the target area and applying the same percentages to the 1991 state census data. The total was than increased by 14% to reflect the difference between the 1991 census and the UN mid 1998 estimate. 33% of total population.

Metroplitan area population for 8 selected cities. Total increased by 14% to reflect increase in general population. Note: urbanisation rate may be higher than population growth rate.

Total for 'city' populations for selected cities from 1991 census data increased by 14% to reflect general population increase.

'Peri-urban' population. Difference between metropolitan and city populations.

Cities >500,000 in target area: Allahabad, Benares, Gorakhpur, Kanpur, Lucknow, Patna.

74% rural from national statistics. Area includes cities of Patna, Benares, Gorakpur, Lucknow, Allahabad, Kanpur, Agra, Bareilly, Delhi & New Delhi.

Additional cities >500,000 in expanded target area: Agra, Amritsar, Bareilly, Dehli.

Cities >500,000 in target area: Agra, Ahmedabad, Amritsar, Bangalore, Delhi, Gwalior, Jaipur, Kanpur, Kota, Lucknow, Ludhiana, Madras. Madurai, Mysore, Solapur, Tiruchchirappalli, Vadodara.

Notes – India		State	Pop 91	rural	SA (1)		SA (2)		HP(1)		HP(2)	
		Tamil N	55859	66%	60%	33515.4	90%	50273.1				
Calcutta	11100000	Karnataka	44977	69%	70%	31483.9	75%	33732.75				
Kanpur	1875000	And. P.	66508	73%	60%	39904.8	80%	53206.4				
Patna	1025000	Maharash.	78937	61%	50%	39468.5	75%	59202.75				
Delhi	7200000	Madhya P.	66181	77%	25%	16545.25	70%	46326.7				
Benares	925000	Gujarat	41310	66%	60%	24786	70%	28917				
N Delhi	273036	Rajasthan	44006	77%	40%	17602.4	40%	17602.4				
Lucknow	1060000	Uttar P.	139112	80%	40%	55644.8	75%	104334	60%	83467.2	80%	111289.6
Jaipur	1025000	Bihar	86374	87%	0		50%	43187	75%	64780.5	75%	64780.5
Ahmedabac	2400000	Haryana	16464	75%	40%	6585.6	50%	6585.6			90%	14817.6
Nagpur	1302000	Punjab	20282	70%	40%	8112.8	50%	10141			90%	18253.8
Bombay	9950000	Delhi	9421	10%	100%	9421	100%	9421			100%	9421
Pune	1775000	Chandigargl	642	10%	0		100%	642				
Hyderabad	2750000											
Vishakhapa	603630					283070.45		463571.7		148247.7		218562.5
Amritsar	294844	14% increase				322700.313		528471.7		169002.4		249161.3
Mangalore	306078											
Bangalore	2950000											
Madras	4475000	91 census	846303	74%								
Cochin	682836	98 UN est	970933									
Madurai	960000	increase	14%									
Hubli-Dhar	648298											

Random selection for PU

HDR data 1999		1991 City		Metro	14%inc(C)	14%inc(M)	Areasqkm
Nat pop	966200000	Agra	891790	948063	1016640.6	1080791.82	
%urban	27.4	Bangalore	2660088	4130288	3032500.32	4708528.32	366
		Bombay	9925891	12596243	11315515.7	14359717	
ESRI 98	894608700	Calcutta	4399819	11021918	5015793.66	12564986.5	852
		Kharagpur	177989	264842	202907.46	301919.88	
		Hyderabad	2964638	4344437	3379687.32	4952658.18	217
		Hubli-Dhar	648298	750000	739059.72	855000	
		Shillong	131719	223366	150159.66	254637.24	
		Total	21800232	34279157	24852264.5	39078239	

estimate

www.un.org./Depts/unsd/demog/356.htm
1991 data

TARGET COUNTRY PS CHARACTERISTICS

Interaction of rainfall, LGP and soils data. Rainfall 900mm+, LGP 7mths+ and soil classes: Ferrasol, Luvisol, Cambisol, Nitosol, Vertisol, Acrisol, Planosol and Andosol.

KENYA	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)							580367	ESRI 98
Human population: Total							29008000	Un mid98
Rural							20189568	
Urban							8818432	
PS data:								
Land area (sqkm)	107551							
Human population: Total	21331760							
Rural	14932232							
Urban	6399528							
Market infrastructure:								
Road density (km roads per PS on 5 pt scale)	3.5							
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)	0.11157							
Assessment of export potential (mid point of PS to major town [km])	100							
Land productivity potential	4							
Poverty status: Average GDP (USD per annum per capita,1997)	1190						1190	UNDP1999
Literacy rate % (1997, national)	79.3						79.3	UNDP1999
Harvard scale data								
% children with acceptable weight/height to age	72							
NR knowledge base (Degree level of national researchers) : % BSc	50							
% MSc	42							
% PhD	8							
Agricultural Research: No of scientists (1991)	819							
Share of GDP to Ag R (1991)	0.5							

Density scale: 5=dense, 1=sparse.

18% of land area.

'Real GDP per capita' from UNDP 1999.

Area of greatest population density is the target area. Guesstimate made as to what proprtion of provincial populations to include. See notes. 73% of total population.

70% of population from national data.

30% of population from national data.

Towns in target area: Kitale, Eldoret, Kisumu, Nakuru, Nairobi, Mombasa, Kakamega, Butere, Nyeri, Thika, Meru, Machakos.

Adult literacy rate 1997 from UNDP 1999.

1991 data.

Calculations for weights on summary page: GDP	2.5385E+10
Lit	1691608568
weight/height	1535886720
GDP national	3.452E+10
GDP on Ag	172597600
Sci per 1 million national population	28.2335907
Sci per PS population	602.272181
Weighted degree BSc	409.5
Weighted degree MSc	343.98
Weighted degree PhD	65.52

Notes

Nairobi	1286200		
Mombasa	442369		
Rural pop	70%	Bourn/Blench	
Pop den	50per km2	Bourn/Blench	
HDR data 1999			
Nat pop	2840000		
%urban	30.4		
ESRI 98	25835250		

Area of greatest population density is the target area. Guesstimate made as to what proprtion of provincial populations to include

EIU 1988 data			Target	%	New tgt
Central	3117	14.5	3117	100	3117
Nyanza	3507	16.4	3507	100	3507
Western	2544	11.9	2544	100	2544
R Valley	4982	23.2	3000	60	2989.2
Eastern	3769	17.6	2500	70	2638.3
Coast	1829	8.5	1000	55	1005.95
Nairobi	1325	6.2	0	0	
N Eastern	371	1.7	0	0	
	21444	100	15668		15801.45
plus 35%	28949		21179		21331.76

TARGET COUNTRY PS CHARACTERISTICS

Land in the range 300-2500m elevation. Includes central band of country and higher elevation valleys of Himalaya foothills.
Takes in lands characterised as low, mid and high hills and the altitude limits of staple crops such as rice and potato.

Same area as HS production system. Forest-agriculture interface more likely in mid and high hills region.

NEPAL	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)							147293	ESRI 98
Human population: Total							21843000	UN mid 98
Rural							19462113	
Urban							2380887	
PS data:								
Land area (km2)		81430		81430				
Human population: Total		11957582		11957582				
Rural		10654206		10654206				
Urban		1303376		1303376				
Market infrastructure:								
Road density (km roads per PS on 5 pt scale)		1		1				
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)		0.12280		0.12280				
Assessment of export potential (mid point of PS to major city [km])		100		100				
Land productivity potential		3.5						
Poverty status: Average GDP (USD per annum per capita,1997)		1090		1090			1090	UNDP1999
Literacy rate % (1997, national)		38.1		38.1			38.1	UNDP1999
Harvard scale data								
% children with acceptable weight/height to age		53		53				
NR knowledge base								
NR knowledge base (Degree level of national researchers) : % BSc							17	
% MSc								
% PhD								
Agricultural Research: No of scientists (1991)								
Share of GDP to Ag R (1991)								
Calculations for weights on summary page: GDP		13033764380		13033764380				
Lit		455583874.2		455583874.2				
Weight/heoght		633751846		633751846				
GDP national		23808870000						
GDP on Ag		0						
Sci per 1 million national population								
Sci per PS population								
Weighted degree BSc								
Weighted degree MSc								
Weighted degree PhD								

55% of land area. Distortion due to topography.

Calculated from 1981 population data from the administrative regions most closely approximating to the target area and then increassing the total by 45.6% to reflect the increase in the total population from the 1981 data set to the Un mid 1998 estimate.

55% of land area. Distortion due to topography.

10.9% of population according to Human Development Report 1999

'Real GDP per capita' from UNDP 1999.

10.9% of population according to Human Development Report 1999

Adult literacy rate 1997 from UNDP 1999.

Linear measurement only.

Main towns in target area: Ilam, Dhankuta, Sindhuli, Garhi, Charikot, Patan, Kathamandu, Gorkha, Pokhara, Khorpa.

Weight/age only.

1991 data.

Main towns in target area: Ilam, Dhankuta, Sindhuli, Garhi, Charikot, Patan, Kathamandu, Gorkha, Pokhara, Khorpa.

Linear measurement only.

Notes

Kathmandu	320000
HDR data 1999	
Nat pop	22300000
%urban	10.9
ESRI 98	19927280

Calculated from 1981 population data from the administrative regions most closely approximating to the target area and then increassing the total by 45.6% to reflect the increase in the total population from the 1981 data set to the UN mid 1998 estimate.
55% of total population.

TARGET COUNTRY PS CHARACTERISTICS

Based on 300-900mm rainfall per annum. 25-30% of country. Compare with 300-600mm: 5% and 300-1200mm: 90%

Based on LGP 3-6 mths. Occupies northern belt along Kenya and Uganda border, central zone and southern areas borering Mozambique. Occupies 40-50% of country. Compare with 3-4 and 3-5 mths: areas do not take in southern areas.

TANZANIA	HP	HS	SA (1)	SA (2)	FA	LW	PU	National	Source
National data:									
Land area (km2)			Based on proprotional allocation of provincial population data according to percentage of the province that falls within the target area. 27% of total population.					944977	ESRI 98
Human population: Total		26% of total land area						32102000	UN mid 98
Rural								23851786	
Urban								8250214	
		Primary and secondary a roads but not those classified as a track or a trail. Scale 5=dense, 1=sparse.					41% of total land area		
PS data:									
Land area (km2)			248282	392076					
Human population: Total			8699757	16952769					
Rural			6524818	12714576		75% according to national data.	Based on proportional allocation of provincial population data according to the percentage of the province that falls within the target area. 53% of total population.		
Urban			2174939	4238192					
Market infrastructure:									
Road density (km roads per sqkm of PS on 5 pt scale)		Towns in target area: Dodoma, Iringa, Kongoa, Singida, Shinyanga, Nzega.	3	3		25% according to national data.			
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)			0.00002	0.00003					
Assessment of export potential (mid point of PS to major town [km])			150	200		Towns in target area: Dar es Salaam, Mwanza, Arusha, Moshi, Dodoma, Morogoro, Oronga, Mtwara, Lindi, Milandani, Songea, Tonduru.			
Land productivity potential			2	3.5					
Poverty status: Average GDP (USD per annum per capita,1997)		'Real GDP per capita' from UNDP 1999.	580	580				580	UNDP1999
Literacy rate % (1997, national)			71.6	71.6				71.6	UNDP1999
Harvard scale data									
% children with acceptable weight/height to age			80	80					
NR knowledge base (Degree level of national researchers) : % BSc		Adult literacy rate 1997 from UNDP 1999.	44	44					
% MSc			44	44				39	
% PhD			12	12					
Agricultural Research: No of scientists (1991)			546	546					
Share of GDP to Ag R (1991)		1991 data.	25% according to national data.	75% according to national data.					
Calculations for weights on summary page: GDP			5045859060	9832605730					
Lit			622902601	1213818225					
Weight/height			695980560	1356221480					
GDP national			1.8619E+10	1.8619E+10					
GDP on Ag			0	0					
Sci per 1 million national population			17.0082861	17.0082861					
Sci per PS population			147.967956	288.337537					
Weighted degree BSc			240.24	240.24					
Weighted degree MSc			240.24	240.24					
Weighted degree PhD			65.52	65.52					

Notes

Dar	1300000					
Rural pop	75%	Bourn/Blench				
Pop den	30per km2	Bourn/Blench				
DFID definition of SA zone = 400-120mm 80-90% of Tanz		Bourn/Blench				
		Cities:				
HDR data 1999		Dar	1096			
Nat pop	31400000	Mwnaza	252			
%urban	25.7	Tabora	214			
		Mbeya	194			
ESRI 98	28386270	Tanga	172			
		Zanzibar	133			
		Dodoma	85			
Europa Provinces 95		Scenario 1		Scenario 2		
Arusha	1640	50%	820	50%	820	926.6
Dar	1651	0		100%	1651	1865.63
						0
Dodoma	1502	100%	1502	50%	751	848.63
Iringa	1467	100%	1467	100%	1467	1657.71
Kagera	1653	0		100%	1653	1867.89
Kilimanjaro	1345	50%	672.5	100%	1345	1519.85
Lindi	785	0		30%	235.5	266.115
Mara	1178	0		100%	1178	1331.14
Mbeya	1792	15%	268.8	50%	896	1012.48
Morogoro	1526	10%	152.6	40%	610.4	689.752
Kigoma	1043	0		0		0
Mtwara	1079	0		80%	863.2	975.416
Mwanza	2280	30%	684	15%	342	386.46
Pemba	322	0		0		0
Pwani	774	0		40%	309.6	349.848
Rukwa	843	5%	42.15	0		0
Ruvuma	951	0		80%	760.8	859.704
Shinyanga	2152	40%	860.8	20%	430.4	486.352
Singida	961	100%	961	70%	672.7	760.151
Tabora	1257	15%	188.55	5%	62.85	71.0205
Tanga	1590	5%	79.5	60%	954	1078.02
Zanzibar	457	0		0		0
	28248		7698.9		15002.45	
plus 13%	31920.24		8699.757		16952.77	16952.77

TARGET COUNTRY PS CHARACTERISTICS

Land of 1500-2000m elevation. Scattered zone around borders of country. LGPs various but generally 9-10 mths. Rainfall mainly in 900-1500 range.

Based on 50km distance from Lake Kyogya and its drainage line to Lake Victoria. LGP in this zone 9-10 mths except eastern and southern edges. Rainfall 1200mm+ on main area and 900-1200mm in eastern part.

UGANDA	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)							243050	ESRI 98
Human population: Total							21029000	UN mid 98
Rural							18253172	
Urban							2775828	
PS data:								
Land area (km2)		13912			49535			
Human population: Total		2063438			10578750			
Rural		1795191			9203513			
Urban		268247			1375238			
Market infrastructure:								
Road density (km roads per PS on 5 pt scale)		1			4			
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)		0.28752			0.26244			
Assessment of export potential (mid point of PS to major town [km])		40			60			
Land productivity potential		1			4			
Poverty status: Average GDP (USD per annum per capita,1997)		1160			1160		1160	UNDP1999
Literacy rate % (1997, national)		64			64		64	UNDP1999
Harvard scale data								
% children with acceptable weight/height to age		68			68			
NR knowledge base (Degree level of national researchers) : % BSc		20			20			
% MSc		46			46		13	
% PhD		34			34			
Agricultural Research: No of scientists (1991)								
Share of GDP to Ag R (1991)								
Calculations for weights on summary page: GDP		2393587.5			12271350			
Lit		132060			677040			
Weight/height		140313.75			719355			
GDP national		24393640000			24393640000			
GDP on Ag		0			0			
Sci per 1 million national population								
Sci per PS population								
Weighted degree BSc								
Weighted degree MSc								
Weighted degree PhD								

6% of land area.

Calculated using guesstimate proportion of land area falling within target area and applying same proprtion to district population data. Total was increased by 25% to reflect difference in 1990 Eurostat data and UN mid 1998 estimate for Uganda.
10% of total population.

Road density scale: 5=dense, 1=sparse.

'Real GDP per capita' from UNDP 1999.

87% of total using national data.

Adult literacy rate 1997 from UNDP 1999.

13% of total using national data.

1998 data.

Main towns in target area: Kabale, Kasese, Nebbi, Moroto.

20% of land area.

Target area approximated to administrative districts for which Eurostat give 1990 population data. Total increased by 25% to refelect difference between 1989 and 1998 UN data.
50% of total population.

87% of total using national data. Target area includes Kampala. Entebbe and Jinja so may need revision.

13% of total using national data.

Main towns in target area: Masaka, Entebbe, Kampala, Bombo, Jinja, Iganga, Tororo, Mbale, Soroti, Lira, Busembatia, Mbulamuti, Namasagali.

Notes

Kampala	460000		
Rural pop	87%	Bourn/Blench	
Pop den	100per km2	Bourn/Blench	
HDR data 1999			
Nat pop	20000000		
%urban	13.2		
ESRI 98	18144360		

Eurostat 1990 data

Target area LW		Target area HS				
District		District		Portion%	Target	T plus25%
Rakai	396	Mbale	743	30	222.9	278.625
Masaka	849	Kapchorwa	90	30	27	33.75
Mpigi	840	Moroto	226	15	33.9	42.375
Luwero	545	Kotido	235	15	35.25	44.0625
Apac	432	Nebbi	293	30	87.9	109.875
						0
Lira	498	Bundribugy	161	40	64.4	80.5
Soroti	612	Kasese	425	10	42.5	53.125
Kumi	306	Rukungiri	373	30	111.9	139.875
Tororo	965	Kabale	536	100	536	670
Iganga	878	Bushenyi	678	50	339	423.75
Kamuli	449	Mbarara	1000	15	150	187.5
Jinja	271				1650.75	
Mukono	771	HSplus25%			2063.4375	2063.4375
Kampala	651					
Total LW	8463					
Total Ug	16872					
plus 25%	21090					
LWplus25%	10578.75					

APPENDIX 1

TARGET COUNTRY PS CHARACTERISTICS

Based on 3-5 month LGP. Using the rainfall data the DFID definition of SA as 400-1200mm occupies the whole country. Similarly, taking a narrower definition (300-600mm) failed to include the arid western zone around Bulawayo/Victoria falls. Widening the range to 300-900mm covered the entire country except the eastern highlands, which also equates to the 3-6 mth LGP. Target zone roughly half country: S & W and shores of L Kariba.

ZIMBABWE	HP	HS	SA	FA	LW	PU	National	Source
National data:								
Land area (km2)				59% of land area.			390803	ESRI 98
Human population: Total							12685000	UN mid 98
Rural				Based on 25 persons per sq km for target area. 45% of total population.				
Urban								
PS data:								
Land area (km2)			229790					
Human population: Total			5744750	33% of population according to national data.				
Rural			3848983					
Urban			1895768					
Market infrastructure:								
Road density (km roads per PS on 5 pt scale)	Road density scale: 5=dense, 1=sparse.		2.5	Main towns in target area: Hwange, Bulawayo, Gweru, Kwekwe, Zvishavane, Masvingo, Victoria Falls, Lupane, Eastnor, Beitbridge.				
Market demand assessment (towns> 100,000pop/ 1000sqkm of PS)			0.06528					
Assessment of export potential (mid point of PS to major town [km])	'Real GDP per capita' from UNDP 1999.		200					
Land productivity potential			2					
Poverty status: Average GDP (USD per annum per capita,1997)			2350				2350	UNDP1999
Literacy rate % (1997, national)	Adult literacy rate 1997 from UNDP 1999.		90.9				90.9	UNDP1999
Harvard scale data								
% children with acceptable weight/height to age	1991 data.		97					
NR knowledge base (Degree level of national researchers) : % BSc			60					
% MSc			30				23	
% PhD			10					
Agricultural Research: No of scientists (1991)			291					
Share of GDP to Ag R (1991)			0.4					

Notes		
		census
Harare	890000	1189103
Bulawayo	413814	621742
Chiungwiza		247912
HDR data 1999		
Nat pop	11200000	
%urban	33.2	
ESRI 98	11106690	
	Covered	popden
Mat..landN	100%	11to20
Mat..landS	100%	11to20
Mash..land\	10%	20to29
Mash..land(	5%	29to33
Midlands	60%	20to29
Masvingo	80%	33to45
Manicaland	10%	70to86

Calculations for weights on summary page: GDP	13500162500
Lit	522197775
Weight/height	557240750
GDP national	29809750000
GDP on Ag	119239000
Sci per 1 million national population	22.94048088
Sci per PS population	131.7873276
Weighted degree BSc	174.6
Weighted degree MSc	87.3
Weighted degree PhD	29.1

Distribution of Population by Zila, Rural & Urban Residences 1998 (human population in '000')

Source: Bangladesh Bureau of Statistics National Data Bank
http://www.bangla.net/ndb/data-sheet/DEMO_DATA.htm

	Zila	Rural	Urban	Total	Check	
	Bangladesh	**96354**	**26215**	**122569**	122569	
	BARISAL DIV	**7265**	**1178**	**8443**	8443	
1	Barguna	790	90		880	
2	Barisal	2084	411		2495	
3	Bhola	1455	238		1693	
4	Jhalakhati	646	109		755	
5	Patuakhali	1258	170		1428	
6	Pirojpur	1032	160		1192	
	CTG. DIV.	**18629**	**5265**	**23894**	23894	
7	Bandarban	191	80		271	
8	B.Baria	2149	342		2491	
9	Chandpur	2197	158		2355	
10	Chittagong	3229	2964		6193	
11	Comilla	4183	508		4691	
12	Cox's Bazar	1414	253		1667	
13	Feni	1143	135		1278	
14	Khagrachhari	274	126		400	
15	Laksmipur	1277	240		1517	
16	Noakhali	2272	302		2574	
17	Rangamati	300	157		457	
	DHAKA DIV	**26321**	**11446**	**37767**	37767	
18	Dhaka	701	6733		7434	
19	Faridpur	1506	198		1704	
20	Gazipur	1135	739		1874	
21	Gopalganj	1088	102		1190	
22	Jamalpur	1868	273		2141	
23	Kishoreganj	2253	354		2607	
24	Madaripur	1092	114		1206	
25	Manikganj	1192	124		1316	
26	Munshiganj	1189	142		1331	
27	Mymensingh	3958	534		4492	
28	Narayanganj	958	911		1869	
29	Narsingdi	1560	320		1880	
30	Netrokona	1789	182		1971	
31	Rajbari	842	112		954	
32	Shariatpur	977	95		1072	354
33	Sherpur	1159	142		1301	
34	Tangail	3054	371		3425	

	Zila	Rural	Urban	Total	Check	
	SYLHET DIV	**6900**	**919**	**7819**	7819	
35	Habiganj	1592	167		1759	
36	Maulvi.Bazar	1429	152		1581	
37	Sunamganj	1803	175		1978	
38	Sylhet	2076	425		2501	
	KHULNA DIV	**11562**	**2959**	**14521**	14521	
39	Bagerhat	1391	240		1631	
40	Chuadanga	670	251		921	
41	Jessore	2057	360		2417	
42	Jhenaidah	1334	226		1560	
43	Khulna	1095	1264		2359	590
44	Kushtia	1501	215		1716	
45	Magura	753	75		828	
46	Meherpur	502	62		564	
47	Narail	630	86		716	
48	Satkhira	1629	180		1809	1809
	RAJSHAHI DIV	**25677**	**4448**	**30125**	30125	
49	Bogra	2709	388		3097	3097
50	Dinajpur	2246	369		2615	2615
51	Gaibandha	2062	196		2258	745
52	Joypurhat	780	104		884	
53	Kurigram	1574	266		1840	
54	Lalmonirhat	913	129		1042	1042
55	Naogaon	2249	237		2486	2486
56	Natore	1325	197		1522	1522
57	Nawabganj	1112	245		1357	1357
58	Nilphamari	1341	203		1544	1544
59	Pabna	1825	371		2196	2196
60	Panchagarh	703	76		779	779
61	Rajshahi	1476	765		2241	
62	Rangpur	2051	447		2498	
63	Sirajganj	2276	331		2607	
64	Thakurgaon	1035	124		1159	

Approximate population in coastal area	**18447**
Approx proportion of popln in coastal area	**1689**
Approx total population in coastal area	**20136**

APPENDIX 1

PRODUCTION SYSTEMS CHARACTERISATION
MASTER SUMMARY SHEET

1997 ('000)	%SA(1)	%SA(2)	%HP(1)	%HP(2)	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
INDIA					79495	9441	62476	23927	10171	282685	208	780	19239	63737
Andrha Pr	60	80			9195	785	5	640	920	15216	1		5	4221
Arun Pr					140	48	9	509	11			1	40	22
Assam					3390	13	95	212	565	1490		425	505	698
Bihar		50	75	75	6911	1248	4181	624	115	5644			1572	3250
Goa					128			759		55				36
Gujarat	60	70			827	374	1124	863	1244	10511			461	4459
Haryana	40	50		90	1860	44	7350	547		8090			141	4062
Him Pr					111	661	544	33		67		1	121	663
J&K					509	468	349	373		7			3	641
Karnataka	70	75			3019	1201	150	742	606	24918	145	5	251	3003
Kerala					932			2714	597	464	46	62		2118
Mad Pr	25	70			5705	1151	6468	4122	458	2023			524	5048
Maharash	50	75			2563	338	898	2449	2217	46656			76	4812
Manipur					338	7			41	41			17	64
Meghalaya					119	21	6	2	61	2			122	54
Mizoram					102	15		12	11	9			1	9
Nagaland					185	31	2	167		120			20	43
Orissa					6226	200	5	1210	346	1574			90	584
Punjab	40	50		90	6768	307	12724	2208		8620			874	6215
Rajastan	40	40			118	808	5493	1519		1385			19	5103
Sikkim					22	55	15	474	1				24	32
Tamil N	60	90			7563	87		360	2907	34576	16	114	127	3695
Tripura					466	2	5	5	33	75		7	77	38
Uttar Pr	40	75	60	80	10408	1470	22203	2280	38	119830			7910	11321
Wbengal					11887	107	850	1101		1312		165	6258	3250
Delhi	100	100		100	3			2						257
Chandigargh		100											1	39

Primary production by State by PS:

SA 1	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
Andrha Pr	6.94	4.99	0.00	1.60	5.43	3.23	0.29	0.00	0.02	3.97
Gujarat	0.62	2.38	1.08	2.16	7.34	2.23	0.00	0.00	1.44	4.20
Haryana	0.94	0.19	4.71	0.91	0.00	1.14	0.00	0.00	0.29	2.55
Karnataka	2.66	8.90	0.17	2.17	4.17	6.17	48.80	0.45	0.91	3.30
Mad Pr	1.79	3.05	2.59	4.31	1.13	0.18	0.00	0.00	0.68	1.98
Maharash	1.61	1.79	0.72	5.12	10.90	8.25	0.00	0.00	0.20	3.77
Punjab	3.41	1.30	8.15	3.69	0.00	1.22	0.00	0.00	1.82	3.90
Rajastan	0.06	3.42	3.52	2.54	0.00	0.20	0.00	0.00	0.04	3.20
Tamil N	5.71	0.55	0.00	0.90	17.15	7.34	4.62	8.77	0.40	3.48
Uttar Pr	5.24	6.23	14.22	3.81	0.15	16.96	0.00	0.00	16.45	7.10
Delhi	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.40
Total	28.98	32.80	35.14	27.23	46.26	46.92	53.70	9.22	22.24	37.86

APPENDIX 1
India Supplement

TARGET COUNTRY PS CHARACTERISTICS

Primary production by State by PS:

SA 2	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
Andrha Pr	9.25	6.65	0.01	2.14	7.24	4.31	0.38	0.00	0.02	5.30
Bihar	4.35	6.61	3.35	1.30	0.57	1.00	0.00	0.00	4.09	2.55
Gujarat	0.73	2.77	1.26	2.52	8.56	2.60	0.00	0.00	1.68	4.90
Haryana	1.17	0.23	5.88	1.14	0.00	1.43	0.00	0.00	0.37	3.19
Karnataka	2.85	9.54	0.18	2.33	4.47	6.61	52.28	0.48	0.98	3.53
Mad Pr	5.02	8.53	7.25	12.06	3.15	0.50	0.00	0.00	1.91	5.54
Maharash	2.42	2.69	1.08	7.68	16.35	12.38	0.00	0.00	0.30	5.66
Punjab	4.26	1.63	10.18	4.61	0.00	1.52	0.00	0.00	2.27	4.88
Rajastan	0.06	3.42	3.52	2.54	0.00	0.20	0.00	0.00	0.04	3.20
Tamil N	8.56	0.83	0.00	1.35	25.72	11.01	6.92	13.15	0.59	5.22
Uttar Pr	9.82	11.68	26.65	7.15	0.28	31.79	0.00	0.00	30.84	13.32
Delhi	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.40
Total	48.49	54.58	59.35	44.84	66.34	73.35	59.59	13.63	43.07	57.69

HP 1	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
Bihar	6.52	9.91	5.02	1.96	0.85	1.50	0.00	0.00	6.13	3.82
Uttar Pr	7.86	9.34	21.32	5.72	0.22	25.43	0.00	0.00	24.67	10.66
Total	14.38	19.26	26.34	7.67	1.07	26.93	0.00	0.00	30.80	14.48

HP 2	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
Bihar	6.52	9.91	5.02	1.96	0.85	1.50	0.00	0.00	6.13	3.82
Haryana	2.11	0.42	10.59	2.06	0.00	2.58	0.00	0.00	0.66	5.74
Punjab	7.66	2.93	18.33	8.31	0.00	2.74	0.00	0.00	4.09	8.78
Uttar Pr	10.47	12.46	28.43	7.62	0.30	33.91	0.00	0.00	32.89	14.21
Delhi	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.40
Total	26.77	25.72	62.37	19.95	1.15	40.73	0.00	0.00	43.77	32.95

SUMMARY	Rice	Maize	Wheat	TotPulses	Banana	Sugarcane	Coffee	Tea	Potato	Milk
SA 1	30	32	35	27	46	47	54	9	22	38
SA 2	48	55	59	45	66	73	60	14	43	58
HP 1	14	19	26	8	1	27	0	0	31	14
HP 2	27	26	62	20	1	41	0	0	44	33

APPENDIX 1 PRODUCTION SYSTEMS CHARACTERISATION MASTER SUMMARY SHEET

Rough correspondence of Nepal target area population to some of the 75 administrative districts - 1981 data

EASTERN		CENTRAL		WESTERN		MID WESTERN		FAR WESTERN	
Ilam	178356	Sindhuli	183705	Arghkhach	157304	Dang Deokhuri	266393	Dadeldhura	868853
Dhankuta	129781	Ramechhap	161445	Gulumi	238113	Pyuthang	157669	Doti	153135
Terhathum	92542	Dolakhla	150576	Palapa	214442	Rolpa	168116	Baitadi	179136
Bhojpur	192689	Makawanpur	243411	Baglung	215228	Jajarkot	99312	Achham	185212
Udayapur	159805	Kathmandu	422237	Kaski	221272	Salyan	152063	Bajura	74649
Khotang	215571	Dhading	243401	Tanahu	223438	Surkhet	166196		
Okhaldhunga	137640	Khavrepalanchok	307150	Syangja	271824	Dailekh	166527		
		Parsa	284338	Gorkha	231292				
		Lalipur	184341	Lamjung	152720				
		Bhaktapur	159767						
		Nuwakot	202976						
TOTALS	1106384		2543347		1925633		1176276	1460985	8212625
1981 Total population for Nepal			15000000			Regional total increased by 45.6%			11957582
1998 UN estimate for Nepal			21843000	(Increased by 45.6%)					

Agriculture	1989/90	Rice Mt	Wheat Mt	Maize Mt	Millet Mt	Potato Mt	Sugarcane Mt
Total		3389670	854960	1200990	224780	671810	988300
EASTERN	Ilam	23260	5540	23100	3560	24500	320
	Dhankuta	17810	3890	29700	7910	9910	840
	Terhathum	18250	1520	17050	3170	11550	320
	Bhojpur	28470	2250	27720	5310	13200	320
	Udayapur	25850	5200	15900	1160	5440	1250
	Khotang	23580	10870	20180	6830	12690	330
	Okhaldhunga	9620	1760	13430	2930	13110	480
CENTRAL	Sindhuli	25750	6390	23140	2750	10410	2000
	Ramechhap	7290	4290	24150	3000	12420	1200
	Dolakhla	5060	4410	7010	2000	15600	120
	Makawanpur	32170	10370	33990	5500	18000	
	Kathmandu	44240	13120	11070	1470	11420	
	Dhading	29800	7200	24930	4800	10780	17600
Agriculture contd	1989/90	Rice Mt	Wheat Mt	Maize Mt	Millet Mt	Potato Mt	Sugarcane Mt

APPENDIX 1
Nepal Supplement

TARGET COUNTRY PS CHARACTERISTICS

CENTRAL contd	Khavrepalanchok	33620	19000	43470	1680	30000	3800
	Parsa	132870	27880	10280	300	7440	52500
	Lalipur	18560	8410	10710	1860	4320	
	Bhaktapur	25440	7760	4710	80	9000	
	Nuwakot	38230	8800	29670	3750	11200	4200
WESTERN	Arghkhach	8680	5300	21670	2030	1890	
	Gulumi	19730	4730	32590	4780	3360	700
	Palapa	20950	7350	25960	5480	4640	980
	Baglung	11920	7320	20070	4940	5200	
	Kaski	41100	9410	22400	11430	5100	700
	Tanahu	30840	5330	36210	9350	3200	340
	Syangja	35050	11650	49300	26430	4950	3150
	Gorkha	31980	5540	28150	11040	12950	850
	Lamjung	23650	5680	25220	10800	7820	720
MID WESTERN	Dang Deokhuri	91840	29210	37650	490	7600	
	Pyuthang	11700	9770	15650	2690	3360	
	Rolpa	8710	7720	16160	1120	7500	
	Jajarkot	5840	5400	12880	2350	3000	
	Salyan	11020	15100	32000	4110	4500	
	Surkhet	17260	22430	23280	1910	4490	600
	Dailekh	9000	6250	14310	3050	3050	300
FAR WESTERN	Dadeldhura	12070	9240	4970	3780	5180	750
	Doti	11500	11320	20550	1910	3570	150
	Baitadi	7650	6530	8450	1360	5180	300
	Achham	6960	5940	7510	1980	4620	150
	Bajura	5060	4140	1420	2190	3660	
Total, selected districts		962380	344020	826610	171280	335810	94970
%Nepal		28.39	40.24	68.83	76.20	49.99	9.61

APPENDIX 2 - SIMPLE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Characterisation Criteria		Ref	Production Systems, Version 1					
			HP (1)	HS	SA (1)	FA (2)	LW (1)	PU
Land area (km^2)		1	521,307 **5**	278,927 **3**	1,505,332 **6**	374,472 **4**	153,362 **2**	0 **1**
Population		2	201,480,731 **5**	14,913,896 **2**	249,172,032 **6**	12,590,380 **1**	70,690,251 **4**	42,846,239 **3**
Market Feasibility	Road Density	3a	4.17 **2**	1.67 **5**	3.17 **4**	1.67 **5**	4.00 **3**	5.00 **1**
	Market Demand Assessment	3b	0.10 **5**	0.15 **3**	0.03 **6**	0.11 **4**	0.21 **2**	1.00 **1**
Potential	Assessment of Export Potential	4a	133.33 **4**	96.67 **3**	183.33 **5**	183.33 **5**	80.00 **2**	0.00 **1**
	Land Productivity Potential	4b	4.00 **2**	2.17 **3**	2.00 **4**	1.83 **5**	4.50 **1**	0.00 **6**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,452 **5**	1,556 **4**	1,653 **3**	2,301 **1**	1,050 **6**	1,667 **2**
	Literacy Rate % (1997, weighted)	5b	51.31 **3**	49.96 **4**	54.60 **2**	49.75 **5**	38.90 **6**	54.63 **1**
	Harvard Scale Data (% children weight/height)	5c	56.30 **3**	63.42 **1**	55.40 **5**	55.78 **4**	57.00 **2**	53.38 **6**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **4**	0.0000 **3.5**	0.1545 **3**	0.0961 **6**	0.0000 **3.5**	0.1529 **5**
	NR Research Scientists (1991) per population of PS	6b	2,491 **3**	0 **3.5**	1,885 **4**	77 **6**	0 **3.5**	249 **5**
	NR Research Scientists (1991) per 1m population of PS	6c	10 **3**	0 **3.5**	6 **5**	4 **6**	0 **3.5**	6 **5**

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used

Characterisation Criteria		Ref	Production Systems, Version 2					
			HP (2)	HS	SA (2)	FA (1)	LW (2)	PU
Land area (km²)		1	695,117 5	278,927 3	2,242,353 6	386,480 4	187,483 2	0 1
Population		2	260,798,296 5	14,913,896 1	407,632,645 6	15,685,378 2	79,770,308 4	42,846,239 3
Market Feasibility	Road Density	3a	4.17 3	1.67 6	3.50 4	2.33 5	4.33 2	5.00 1
	Market Demand Assessment	3b	0.10 5	0.15 2	0.03 6	0.10 4	0.11 3	1.00 1
Potential	Assessment of Export Potential	4a	133.33 4	96.67 3	200.00 6	166.67 5	83.33 2	0.00 1
	Land Productivity Potential	4b	4.17 2	2.17 4	2.83 3	1.83 5	5.00 1	0.00 6
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,502 5	1,556 4	1,644 3	2,157 1	1,160 6	1,667 2
	Literacy Rate % (1997, weighted)	5b	51.82 4	49.96 5	54.45 2	54.34 3	40.19 6	54.63 1
	Harvard Scale Data (% children weight/height)	5c	55.77 4	63.42 1	55.46 5	60.27 2	58.01 3	53.38 6
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 4	0.0000 3.5	0.1545 3	0.0961 6	0.0000 3.5	0.1529 5
	NR Research Scientists (1991) per population of PS	6b	2,889 3	0 3.5	3,049 4	148 6	0 3.5	249 5
	NR Research Scientists (1991) per 1m population of PS	6c	9 3	0 3.5	6 4	7 6	0 3.5	6 4

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Characterisation Criteria		Ref	Production Systems, Version 3					
			HP (1)	HS	SA (2)	FA (1)	LW (3)	PU
Land area (km^2)		1	695,117 5	278,927 3	2,242,353 6	386,480 4	124,149 2	0 1
Population		2	201,480,731 5	14,913,896 1	407,632,645 6	15,685,378 2	77,463,608 4	42,846,239 3
Market Feasibility	Road Density	3a	4.17 2	1.67 6	3.50 4	2.33 5	4.00 3	5.00 1
	Market Demand Assessment	3b	0.10 5	0.15 2	0.03 6	0.10 4	0.14 3	1.00 1
Potential	Assessment of Export Potential	4a	133.33 4	96.67 2	200.00 6	166.67 5	100.00 3	0.00 1
	Land Productivity Potential	4b	4.17 2	2.17 4	2.83 3	1.83 5	5.00 1	0.00 6
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,502 5	1,556 4	1,644 3	2,157 1	1,050 6	1,667 2
	Literacy Rate % (1997, weighted)	5b	51.82 4	49.96 5	54.45 2	54.34 3	38.90 6	54.63 1
	Harvard Scale Data (% children weight/height)	5c	55.77 4	63.42 1	55.46 5	60.27 2	57.00 3	53.38 6
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 4	0.0000 3.5	0.1545 3	0.0961 6	0.0000 3.5	0.1529 5
	NR Research Scientists (1991) per population of PS	6b	2,889 3	0 3.5	3,049 4	148 6	0 3.5	249 5
	NR Research Scientists (1991) per 1m population of PS	6c	9 3	0 3.5	6 4	7 6	0 3.5	6 4

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE RANK SCORING

RANK SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

	Production Systems, Version 1																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (2)			LW (1)			PU							
For each PS, columns to the right specify rank score, mean rank score and weighted mean rank score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**5.0**	5.0	0.5	**3.0**	3.0	0.3	**6.0**	6.0	0.6	**4.0**	4.0	0.4	**2.0**	2.0	0.2	**1.0**	1.0	0.1	0.1	0.1	0.1	0.1	0.1
2. Population	**5.0**	5.0	19.5	**2.0**	2.0	7.8	**6.0**	6.0	23.4	**1.0**	1.0	3.9	**4.0**	4.0	15.6	**3.0**	3.0	11.7	3.9	3.9	3.9	3.9	3.9
3. Marketing feasibility:																							
3a. Road density	**2.0**	3.5	5.3	**5.0**	4.0	6.0	**4.0**	5.0	7.5	**5.0**	4.5	6.8	**3.0**	2.5	3.8	**1.0**	1.0	1.5	1.5	3	1	1	1
3b. Market demand assessment	**5.0**			**3.0**			**6.0**			**4.0**			**2.0**			**1.0**							
4. Potential:																							
4a. Assessment of export potential	**4.0**	3.0	4.5	**3.0**	3.0	4.5	**5.0**	4.5	6.8	**5.0**	5.0	7.5	**2.0**	1.5	2.3	**1.0**	3.5	5.3	1.5	1	3	1	1
4b. Land productivity potential	**2.0**			**3.0**			**4.0**			**5.0**			**1.0**			**6.0**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**5.0**			**4.0**			**3.0**			**1.0**			**6.0**			**2.0**							
5b. Literacy rate % (1997, weighted)	**3.0**	3.7	5.5	**4.0**	3.0	4.5	**2.0**	3.3	5.0	**5.0**	3.3	5.0	**6.0**	4.7	7.0	**1.0**	3.0	4.5	1.5	1	1	3	1
5c. Harvard scale data (% children weight/height)	**3.0**			**1.0**			**5.0**			**4.0**			**2.0**			**6.0**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**4.0**			**3.5**			**3.0**			**6.0**			**3.5**			**5.0**							
6b. NR Research Scientists (1991) per population of PS	**3.0**	3.3	5.0	**3.5**	3.5	5.3	**4.0**	4.0	6.0	**6.0**	6.0	9.0	**3.5**	3.5	5.3	**5.0**	5.0	7.5	1.5	1	1	1	3
6c. NR Research Scientists (1991) per 1m population of PS	**3.0**			**3.5**			**5.0**			**6.0**			**3.5**			**5.0**							
																			10	10	10	10	10

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED SCORES (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 1									
Scenario 1 - Equal weighting on 3-6	**HP(1)**	40.25	**HS**	28.35	**SA(1)**	49.25	**FA(2)**	32.55	**LW (1)**	34.05	**PU**	30.55
Scenario 2 - Increased weighting on 3	**HP(1)**	40.50	**HS**	29.60	**SA(1)**	50.83	**FA(2)**	32.13	**LW (1)**	32.97	**PU**	26.30
Scenario 3 - Increased weighting on 4	**HP(1)**	39.50	**HS**	27.60	**SA(1)**	49.83	**FA(2)**	33.13	**LW (1)**	30.97	**PU**	31.30
Scenario 4 - Increased weighting on 5	**HP(1)**	40.83	**HS**	27.60	**SA(1)**	47.50	**FA(2)**	29.80	**LW (1)**	37.30	**PU**	30.30
Scenario 5 - Increased weighting on 6	**HP(1)**	40.17	**HS**	28.60	**SA(1)**	48.83	**FA(2)**	35.13	**LW (1)**	34.97	**PU**	34.30

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE RANK SCORING

RANK SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

	Production Systems, Version 2																		Weighting Scenarios				
	HP (2)			HS			SA (2)			FA (1)			LW (2)			PU							
For each PS, columns to the right specify rank score, mean rank score and weighted mean rank score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km^2)	**5.0**	5.0	0.5	**3.0**	3.0	0.3	**6.0**	6.0	0.6	**4.0**	4.0	0.4	**2.0**	2.0	0.2	**1.0**	1.0	0.1	0.1	0.1	0.1	0.1	0.1
2. Population	**5.0**	5.0	19.5	**1.0**	1.0	3.9	**6.0**	6.0	23.4	**2.0**	2.0	7.8	**4.0**	4.0	15.6	**3.0**	3.0	11.7	3.9	3.9	3.9	3.9	3.9
3. Marketing feasibility:																							
3a. Road density	**3.0**			**6.0**			**4.0**			**5.0**			**2.0**			**1.0**							
3b. Market demand assessment	**5.0**	4.0	6.0	**2.0**	4.0	6.0	**6.0**	5.0	7.5	**4.0**	4.5	6.8	**3.0**	2.5	3.8	**1.0**	1.0	1.5	1.5	3	1	1	1
4. Potential:																							
4a. Assessment of export potential	**4.0**			**3.0**			**6.0**			**5.0**			**2.0**			**1.0**							
4b. Land productivity potential	**2.0**	3.0	4.5	**4.0**	3.5	5.3	**3.0**	4.5	6.8	**5.0**	5.0	7.5	**1.0**	1.5	2.3	**6.0**	3.5	5.3	1.5	1	3	1	1
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**5.0**			**5.0**			**4.0**			**1.0**			**2.0**			**3.0**							
5b. Literacy rate % (1997, weighted)	**4.0**	4.3	6.5	**5.0**	3.7	5.5	**2.0**	3.7	5.5	**3.0**	2.0	3.0	**6.0**	3.7	5.5	**1.0**	3.3	5.0	1.5	1	1	3	1
5c. Harvard scale data (% children weight/height)	**4.0**			**1.0**			**5.0**			**2.0**			**3.0**			**6.0**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**4.0**			**3.5**			**3.0**			**6.0**			**3.5**			**5.0**							
6b. NR Research Scientists (1991) per population of PS	**3.0**	3.3	5.0	**3.5**	3.5	5.3	**4.0**	3.7	5.5	**6.0**	6.0	9.0	**3.5**	3.5	5.3	**5.0**	4.7	7.0	1.5	1	1	1	3
6c. NR Research Scientists (1991) per 1m population of PS	**3.0**			**3.5**			**4.0**			**6.0**			**3.5**			**4.0**							
																			10	10	10	10	10

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED SCORES (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 2									
Scenario 1 - Equal weighting on 3-6	**HP(2)**	42.00	**HS**	26.20	**SA(2)**	49.25	**FA(1)**	34.45	**LW(2)**	32.55	**PU**	30.55
Scenario 2 - Increased weighting on 3	**HP(2)**	42.67	**HS**	26.87	**SA(2)**	50.83	**FA(1)**	34.70	**LW(2)**	31.97	**PU**	26.30
Scenario 3 - Increased weighting on 4	**HP(2)**	40.67	**HS**	25.87	**SA(2)**	49.83	**FA(1)**	35.70	**LW(2)**	29.97	**PU**	31.30
Scenario 4 - Increased weighting on 5	**HP(2)**	43.33	**HS**	26.20	**SA(2)**	48.17	**FA(1)**	29.70	**LW(2)**	34.30	**PU**	30.97
Scenario 5 - Increased weighting on 6	**HP(2)**	41.33	**HS**	25.87	**SA(2)**	48.17	**FA(1)**	37.70	**LW(2)**	33.97	**PU**	33.63

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE RANK SCORING

RANK SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

For each PS, columns to the right specify rank score, mean rank score and weighted mean rank score (using Scenario 1 weights*) for each characterisation criterion	Production Systems, Version 3																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (1)			LW (3)			PU							
	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**5.0**	5.0	0.5	**3.0**	3.0	0.3	**6.0**	6.0	0.6	**4.0**	4.0	0.4	**2.0**	2.0	0.2	**1.0**	1.0	0.1	0.1	0.1	0.1	0.1	0.1
2. Population	**5.0**	5.0	19.5	**1.0**	1.0	3.9	**6.0**	6.0	23.4	**2.0**	2.0	7.8	**4.0**	4.0	15.6	**3.0**	3.0	11.7	3.9	3.9	3.9	3.9	3.9
3. Marketing feasibility:																							
3a. Road density	**2.0**	3.5	5.3	**6.0**	4.0	6.0	**4.0**	5.0	7.5	**5.0**	4.5	6.8	**3.0**	3.0	4.5	**1.0**	1.0	1.5	1.5	3	1	1	1
3b. Market demand assessment	**5.0**			**2.0**			**6.0**			**4.0**			**3.0**			**1.0**							
4. Potential:																							
4a. Assessment of export potential	**4.0**	3.0	4.5	**2.0**	3.0	4.5	**6.0**	4.5	6.8	**5.0**	5.0	7.5	**3.0**	2.0	3.0	**1.0**	3.5	5.3	1.5	1	3	1	1
4b. Land productivity potential	**2.0**			**4.0**			**3.0**			**5.0**			**1.0**			**6.0**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**5.0**			**4.0**			**3.0**			**1.0**			**6.0**			**2.0**							
5b. Literacy rate % (1997, weighted)	**4.0**	4.3	6.5	**5.0**	3.3	5.0	**2.0**	3.3	5.0	**3.0**	2.0	3.0	**6.0**	5.0	7.5	**1.0**	3.0	4.5	1.5	1	1	3	1
5c. Harvard scale data (% children weight/height)	**4.0**			**1.0**			**5.0**			**2.0**			**3.0**			**6.0**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**4.0**			**3.5**			**3.0**			**6.0**			**3.5**			**5.0**							
6b. NR Research Scientists (1991) per population of PS	**3.0**	3.3	5.0	**3.5**	3.5	5.3	**4.0**	3.7	5.5	**6.0**	6.0	9.0	**3.5**	3.5	5.3	**5.0**	4.7	7.0	1.5	1	1	1	3
6c. NR Research Scientists (1991) per 1m population of PS	**3.0**			**3.5**			**4.0**			**6.0**			**3.5**			**4.0**							
																			10	10	10	10	10

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED SCORES (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 3											
Scenario 1 - Equal weighting on 3-6	**HP(1)**	41.25	**HS**	24.95	**SA(1)**	48.75	**FA(1)**	34.45	**LW(3)**	36.05	**PU**	30.05
Scenario 2 - Increased weighting on 3	**HP(1)**	41.17	**HS**	26.03	**SA(1)**	50.50	**FA(1)**	34.70	**LW(3)**	35.30	**PU**	25.97
Scenario 3 - Increased weighting on 4	**HP(1)**	40.17	**HS**	24.03	**SA(1)**	49.50	**FA(1)**	35.70	**LW(3)**	33.30	**PU**	30.97
Scenario 4 - Increased weighting on 5	**HP(1)**	42.83	**HS**	24.70	**SA(1)**	47.17	**FA(1)**	29.70	**LW(3)**	39.30	**PU**	29.97
Scenario 5 - Increased weighting on 6	**HP(1)**	40.83	**HS**	25.03	**SA(1)**	47.83	**FA(1)**	37.70	**LW(3)**	36.30	**PU**	33.30

* / Scenario 1 is used as an example showing how the values for the total weighted scores of each scenario were generated.

KEY: 6 = GREATEST NEED, 1 = LEAST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 2 - SIMPLE RANK SCORING

WEIGHTED IMPORTANCE SCORES SUMMARY BY PRODUCTION SYSTEM AND IMPLICATIONS FOR NRSP's BUDGET ALLOCATIONS

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Total score, sum for all criteria & PS ranking, V1**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V2**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V3**					
HP(1)	HS	SA(1)	FA(2)	LW(1)	PU		HP(2)	HS	SA(2)	FA(1)	LW(2)	PU		HP(1)	HS	SA(1)	FA(1)	LW(3)	PU
40.25	28.35	49.25	32.55	34.05	30.55	1	42.00	26.20	49.25	34.45	32.55	30.55	1	41.25	24.95	48.75	34.45	36.05	30.05
5	1	6	3	4	2		5	1	6	4	3	2		5	1	6	3	4	2
40.50	29.60	50.83	32.13	32.97	26.30	2	42.67	26.87	50.83	34.70	31.97	26.30	2	41.17	26.03	50.50	34.70	35.30	25.97
5	2	6	3	4	1		5	2	6	4	3	1		5	2	6	3	4	1
39.50	27.60	49.83	33.13	30.97	31.30	3	40.67	25.87	49.83	35.70	29.97	31.30	3	40.17	24.03	49.50	35.70	33.30	30.97
5	1	6	4	2	3		5	1	6	4	2	3		5	1	6	4	3	2
40.83	27.60	47.50	29.80	37.30	30.30	4	43.33	26.20	48.17	29.70	34.30	30.97	4	42.83	24.70	47.17	29.70	39.30	29.97
5	1	6	2	4	3		5	1	6	2	4	3		5	1	6	2	4	3
40.17	28.60	48.83	35.13	34.97	34.30	5	41.33	25.87	48.17	37.70	33.97	33.63	5	40.83	25.03	47.83	37.70	36.30	33.30
5	1	6	4	3	2		5	1	6	4	3	2		5	1	6	4	3	2
40.25	**28.35**	**49.25**	**32.55**	**34.05**	**30.55**	Mean Score per PS, across all scenarios	**42.00**	**26.20**	**49.25**	**34.45**	**32.55**	**30.55**	Mean Score per PS, across all scenarios	**41.25**	**24.95**	**48.75**	**34.45**	**36.05**	**30.05**
5	**1**	**6**	**3**	**4**	**2**	Simple rank across PSs	**5**	**1**	**6**	**4**	**3**	**2**	Rank across PSs	**5**	**1**	**6**	**3**	**4**	**2**
18.72	**13.19**	**22.91**	**15.14**	**15.84**	**14.21**	Relative rank across PSs	**19.53**	**12.19**	**22.91**	**16.02**	**15.14**	**14.21**	Relative rank across PSs	**19.14**	**11.58**	**22.62**	**15.99**	**16.73**	**13.94**

WEIGHTED IMPORTANCE SCORES	HP	HS	SA	FA	LW	PU
Mean Score per PS across V1, V2 & V3, with Double Counting	41.17	26.50	49.08	33.82	34.22	30.38
Mean Score per PS for Scenario 4 across V1, 2 & 3, with Double Counting	42.33	26.17	47.61	29.73	36.97	30.41
Overall Importance Rank based on all Scenarios (6 = Greatest Need)	**5**	**1**	**6**	**3**	**4**	**2**
Implication for % Budget Allocation	**19.1**	**12.3**	**22.8**	**15.7**	**15.9**	**14.1**
Overall Importance Rank based on Scenario 4 (6 = Greatest Need)	**5**	**1**	**6**	**2**	**4**	**3**
Implication for % Budget Allocation	**19.9**	**12.3**	**22.3**	**13.9**	**17.3**	**14.3**

** / Rank scores are based on weighted scores values read to seven decimal places

KEY: 6 = GREATEST NEED, 1 = LEAST NEED

APPENDIX 3 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Characterisation Criteria		Ref	Production Systems, Version 1					
			HP (1)	HS	SA (1)	FA (2)	LW (1)	PU
Land area (km^2)		1	521,307 **0.35**	278,927 **0.19**	1,505,332 **1.00**	374,472 **0.25**	153,362 **0.10**	0 **0.00**
Population (Bangladesh & Nepal double counted)		2	201,480,731 **0.81**	14,913,896 **0.06**	249,172,032 **1.00**	12,590,380 **0.05**	70,690,251 **0.28**	42,846,239 **0.17**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.17 **0.53**	1.67 **1.00**	4.00 **0.42**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.28**	0.15 **0.18**	0.03 **1.00**	0.11 **0.25**	0.21 **0.13**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.73**	96.67 **0.53**	183.33 **1.00**	183.33 **1.00**	80.00 **0.44**	0.00 **0.00**
	Land Productivity Potential	4b	4.00 **0.46**	2.17 **0.85**	2.00 **0.92**	1.83 **1.00**	4.50 **0.41**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,452 **0.72**	1,556 **0.67**	1,653 **0.64**	2,301 **0.46**	1,050 **1.00**	1,667 **0.63**
	Literacy Rate % (1997, weighted)	5b	51.31 **0.758**	49.96 **0.779**	54.60 **0.712**	49.75 **0.782**	38.90 **1.000**	54.63 **0.712**
	Harvard Scale Data (% children weight/height)	5c	56.30 **0.948**	63.42 **0.842**	55.40 **0.964**	55.78 **0.957**	57.00 **0.937**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,491 **0.03**	n/a **0.35**	1,885 **0.04**	77 **1.00**	n/a **0.35**	249 **0.31**
	NR Research Scientists (1991) per 1m population of PS	6c	10 **0.40**	n/a **0.68**	6 **0.67**	4 **1.00**	n/a **0.68**	6 **0.67**

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used

Characterisation Criteria		Ref	Production Systems, Version 2					
			HP (2)	HS	SA (2)	FA (1)	LW (2)	PU
Land area (km^2)		1	695,117 **0.31**	278,927 **0.12**	2,242,353 **1.00**	386,480 **0.17**	187,483 **0.08**	0 **0.00**
Population (Bangladesh & Nepal double counted)		2	260,798,296 **0.64**	14,913,896 **0.037**	407,632,645 **1.00**	15,685,378 **0.038**	79,770,308 **0.20**	42,846,239 **0.11**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.50 **0.48**	2.33 **0.71**	4.33 **0.38**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.29**	0.15 **0.19**	0.03 **1.00**	0.10 **0.28**	0.11 **0.26**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.67**	96.67 **0.48**	200.00 **1.00**	166.67 **0.83**	83.33 **0.42**	0.00 **0.00**
	Land Productivity Potential	4b	4.17 **0.44**	2.17 **0.85**	2.83 **0.65**	1.83 **1.00**	5.00 **0.37**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,502 **0.77**	1,556 **0.75**	1,644 **0.71**	2,157 **0.54**	1,160 **1.00**	1,667 **0.70**
	Literacy Rate % (1997, weighted)	5b	51.82 **0.776**	49.96 **0.804**	54.45 **0.738**	54.34 **0.740**	40.19 **1.000**	54.63 **0.736**
	Harvard Scale Data (% children weight/height)	5c	55.77 **0.957**	63.42 **0.842**	55.46 **0.963**	60.27 **0.886**	58.01 **0.920**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,889 **0.05**	n/a **0.42**	3,049 **0.05**	148 **1.00**	n/a **0.42**	249 **0.59**
	NR Research Scientists (1991) per 1m population of PS	6c	9 **0.67**	n/a **0.88**	6 **1.00**	7 **0.86**	n/a **0.88**	6 **1.00**

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Characterisation Criteria		Ref	Production Systems, Version 3					
			HP (1)	HS	SA (1)	FA (1)	LW (3)	PU
Land area (km^2)		1	521,307 **0.35**	278,927 **0.19**	1,505,332 **1.00**	374,472 **0.25**	124,149 **0.08**	0 **0.00**
Population (Bangladesh & Nepal double counted)		2	201,480,731 **0.81**	14,913,896 **0.06**	249,172,032 **1.00**	15,685,378 **0.06**	77,463,608 **0.31**	42,846,239 **0.17**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.17 **0.53**	1.67 **1.00**	4.00 **0.42**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.28**	0.15 **0.18**	0.03 **1.00**	0.11 **0.25**	0.14 **0.20**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.73**	96.67 **0.53**	183.33 **1.00**	183.33 **1.00**	100.00 **0.55**	0.00 **0.00**
	Land Productivity Potential	4b	4.00 **0.46**	2.17 **0.85**	2.00 **0.92**	1.83 **1.00**	5.00 **0.37**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,452 **0.72**	1,556 **0.67**	1,653 **0.64**	2,301 **0.46**	1,050 **1.00**	1,667 **0.63**
	Literacy Rate % (1997, weighted)	5b	51.31 **0.758**	49.96 **0.779**	54.60 **0.712**	49.75 **0.782**	38.90 **1.000**	54.63 **0.712**
	Harvard Scale Data (% children weight/height)	5c	56.30 **0.948**	63.42 **0.842**	55.40 **0.964**	55.78 **0.957**	57.00 **0.937**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,491 **0.03**	n/a **0.35**	1,885 **0.04**	77 **1.00**	n/a **0.35**	249 **0.31**
	NR Research Scientists (1991) per 1m population of PS	6c	10 **0.40**	n/a **0.68**	6 **0.67**	4 **1.00**	n/a **0.68**	6 **0.67**

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING RELATIVE SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

	Production Systems, Version 1																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (2)			LW (1)			PU							
For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.35**	0.35	0.00	**0.19**	0.19	0.00	**1.00**	1.00	0.01	**0.25**	0.25	0.00	**0.10**	0.10	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.81**	0.81	0.32	**0.06**	0.06	0.02	**1.00**	1.00	0.39	**0.05**	0.05	0.02	**0.28**	0.28	0.11	**0.17**	0.17	0.07	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.59	0.09	**0.53**	0.76	0.11	**1.00**	0.62	0.09	**0.42**	0.27	0.04	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.28**			**0.18**			**1.00**			**0.25**			**0.13**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.73**	0.59	0.09	**0.53**	0.69	0.10	**1.00**	0.96	0.14	**1.00**	1.00	0.15	**0.44**	0.42	0.06	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.46**			**0.85**			**0.92**			**1.00**			**0.41**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.72**			**0.67**			**0.64**			**0.46**			**1.00**			**0.63**							
5b. Literacy rate % (1997, weighted)	**0.76**	0.81	0.12	**0.78**	0.77	0.11	**0.71**	0.77	0.12	**0.78**	0.73	0.11	**1.00**	0.98	0.15	**0.71**	0.78	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.95**			**0.84**			**0.96**			**0.96**			**0.94**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.03**	0.35	0.05	**0.35**	0.58	0.09	**0.04**	0.44	0.07	**1.00**	1.00	0.15	**0.35**	0.58	0.09	**0.31**	0.53	0.08	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.40**			**0.68**			**0.67**			**1.00**			**0.68**			**0.67**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 1											
Scenario 1 - Equal weighting on 3-6	**HP(1)**	0.63	**HS**	0.42	**SA(1)**	0.84	**FA(2)**	0.53	**LW(1)**	0.45	**PU**	0.29
Scenario 2 - Increased weighting on 3	**HP(1)**	0.60	**HS**	0.41	**SA(1)**	0.85	**FA(2)**	0.48	**LW(1)**	0.38	**PU**	0.25
Scenario 3 - Increased weighting on 4	**HP(1)**	0.65	**HS**	0.43	**SA(1)**	0.89	**FA(2)**	0.56	**LW(1)**	0.41	**PU**	0.22
Scenario 4 - Increased weighting on 5	**HP(1)**	0.69	**HS**	0.44	**SA(1)**	0.85	**FA(2)**	0.50	**LW(1)**	0.52	**PU**	0.37
Scenario 5 - Increased weighting on 6	**HP(1)**	0.60	**HS**	0.40	**SA(1)**	0.78	**FA(2)**	0.56	**LW(1)**	0.44	**PU**	0.32

* / Scenario 1 is used as an example showing how the values for the total weighted scores of each scenario were generated.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING RELATIVE SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

	Production Systems, Version 2																		Weighting Scenarios				
	HP (2)			HS			SA (2)			FA (1)			LW (2)			PU							
For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	**Scenario 1 Weights**	**Scenario 2 Weights**	**Scenario 3 Weights**	**Scenario 4 Weights**	**Scenario 5 Weights**
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.31**	0.31	0.00	**0.12**	0.12	0.00	**1.00**	1.00	0.01	**0.17**	0.17	0.00	**0.08**	0.08	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.64**	0.64	0.25	**0.04**	0.04	0.01	**1.00**	1.00	0.39	**0.04**	0.04	0.02	**0.20**	0.20	0.08	**0.11**	0.11	0.04	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.60	0.09	**0.48**	0.74	0.11	**0.71**	0.50	0.07	**0.38**	0.32	0.05	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.29**			**0.19**			**1.00**			**0.28**			**0.26**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.67**	0.55	0.08	**0.48**	0.66	0.10	**1.00**	0.82	0.12	**0.83**	0.92	0.14	**0.42**	0.39	0.06	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.44**			**0.85**			**0.65**			**1.00**			**0.37**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.77**			**0.75**			**0.71**			**0.54**			**1.00**			**0.70**							
5b. Literacy rate % (1997, weighted)	**0.78**	0.84	0.13	**0.80**	0.80	0.12	**0.74**	0.80	0.12	**0.74**	0.72	0.11	**1.00**	0.97	0.15	**0.74**	0.81	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.96**			**0.84**			**0.96**			**0.89**			**0.92**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.05**	0.45	0.07	**0.42**	0.67	0.10	**0.05**	0.56	0.08	**1.00**	0.95	0.14	**0.42**	0.67	0.10	**0.59**	0.74	0.11	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.67**			**0.88**			**1.00**			**0.86**			**0.88**			**1.00**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 2											
Scenario 1 - Equal weighting on 3-6	**HP(2)**	0.58	**HS**	0.43	**SA(2)**	0.84	**FA(1)**	0.48	**LW(2)**	0.43	**PU**	0.30
Scenario 2 - Increased weighting on 3	**HP(2)**	0.54	**HS**	0.41	**SA(2)**	0.77	**FA(1)**	0.43	**LW(2)**	0.38	**PU**	0.25
Scenario 3 - Increased weighting on 4	**HP(2)**	0.58	**HS**	0.42	**SA(2)**	0.86	**FA(1)**	0.51	**LW(2)**	0.39	**PU**	0.21
Scenario 4 - Increased weighting on 5	**HP(2)**	0.64	**HS**	0.45	**SA(2)**	0.85	**FA(1)**	0.47	**LW(2)**	0.51	**PU**	0.38
Scenario 5 - Increased weighting on 6	**HP(2)**	0.56	**HS**	0.42	**SA(2)**	0.80	**FA(1)**	0.52	**LW(2)**	0.45	**PU**	0.36

* / Scenario 1 is used as an example showing how the values for the total weighted scores of each scenario were generated.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING RELATIVE SCORES AND DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

	Production Systems, Version 3																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (1)			LW (3)			PU							
For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.35**	0.35	0.00	**0.19**	0.19	0.00	**1.00**	1.00	0.01	**0.25**	0.25	0.00	**0.08**	0.08	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.81**	0.81	0.32	**0.06**	0.06	0.02	**1.00**	1.00	0.39	**0.06**	0.06	0.02	**0.31**	0.31	0.12	**0.17**	0.17	0.07	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.59	0.09	**0.53**	0.76	0.11	**1.00**	0.62	0.09	**0.42**	0.31	0.05	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.28**			**0.18**			**1.00**			**0.25**			**0.20**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.73**	0.59	0.09	**0.53**	0.69	0.10	**1.00**	0.96	0.14	**1.00**	1.00	0.15	**0.55**	0.46	0.07	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.46**			**0.85**			**0.92**			**1.00**			**0.37**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.72**			**0.67**			**0.64**			**0.46**			**1.00**			**0.63**							
5b. Literacy rate % (1997, weighted)	**0.76**	0.81	0.12	**0.78**	0.77	0.11	**0.71**	0.77	0.12	**0.78**	0.73	0.11	**1.00**	0.98	0.15	**0.71**	0.78	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.95**			**0.84**			**0.96**			**0.96**			**0.94**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.03**	0.35	0.05	**0.35**	0.58	0.09	**0.04**	0.44	0.07	**1.00**	1.00	0.15	**0.35**	0.58	0.09	**0.31**	0.53	0.08	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.40**			**0.68**			**0.67**			**1.00**			**0.68**			**0.67**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 3											
Scenario 1 - Equal weighting on 3-6	**HP(1)**	0.63	**HS**	0.42	**SA(1)**	0.84	**FA(1)**	0.53	**LW(3)**	0.47	**PU**	0.29
Scenario 2 - Increased weighting on 3	**HP(1)**	0.60	**HS**	0.41	**SA(1)**	0.85	**FA(1)**	0.49	**LW(3)**	0.42	**PU**	0.25
Scenario 3 - Increased weighting on 4	**HP(1)**	0.65	**HS**	0.43	**SA(1)**	0.89	**FA(1)**	0.56	**LW(3)**	0.45	**PU**	0.22
Scenario 4 - Increased weighting on 5	**HP(1)**	0.69	**HS**	0.44	**SA(1)**	0.85	**FA(1)**	0.51	**LW(3)**	0.55	**PU**	0.37
Scenario 5 - Increased weighting on 6	**HP(1)**	0.60	**HS**	0.40	**SA(1)**	0.78	**FA(1)**	0.56	**LW(3)**	0.47	**PU**	0.32

* / Scenario 1 is used as an example showing how the values for the total weighted scores of each scenario were generated.

FRACTIONAL SCORING RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 3 - RELATIVE SCORING SUMMARY

WEIGHTED IMPORTANCE SCORES SUMMARY BY PRODUCTION SYSTEM AND IMPLICATIONS FOR NRSP's BUDGET ALLOCATIONS

POPULATION DOUBLE COUNTED FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Total score, sum for all criteria & PS ranking, V1**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V2**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V3**					
HP(1)	HS	SA(1)	FA(2)	LW(1)	PU		HP(2)	HS	SA(2)	FA(1)	LW(2)	PU		HP(1)	HS	SA(1)	FA(1)	LW(3)	PU
0.63	0.42	0.84	0.53	0.45	0.29	1	0.58	0.43	0.84	0.48	0.43	0.30	1	0.63	0.42	0.84	0.53	0.47	0.29
5	2	6	4	3	1		5	2	6	4	3	1		5	2	6	4	3	1
0.60	0.41	0.85	0.48	0.38	0.25	2	0.54	0.41	0.77	0.43	0.38	0.25	2	0.60	0.41	0.85	0.49	0.42	0.25
5	3	6	4	2	1		5	3	6	4	2	1		5	2	6	4	3	1
0.65	0.43	0.89	0.56	0.41	0.22	3	0.58	0.42	0.86	0.51	0.39	0.21	3	0.65	0.43	0.89	0.56	0.45	0.22
5	3	6	4	2	1		5	3	6	4	2	1		5	2	6	4	3	1
0.69	0.44	0.85	0.50	0.52	0.37	4	0.64	0.45	0.85	0.47	0.51	0.38	4	0.69	0.44	0.85	0.51	0.55	0.37
5	2	6	3	4	1		5	2	6	3	4	1		5	2	6	3	4	1
0.60	0.40	0.78	0.56	0.44	0.32	5	0.56	0.42	0.80	0.52	0.45	0.36	5	0.60	0.40	0.78	0.56	0.47	0.32
5	2	6	4	3	1		5	2	6	4	3	1		5	2	6	4	3	1
0.63	**0.42**	**0.83**	**0.53**	**0.44**	**0.30**	Mean Score per PS, across all scenarios	**0.58**	**0.42**	**0.82**	**0.49**	**0.43**	**0.31**	Mean Score per PS, across all scenarios	**0.63**	**0.42**	**0.83**	**0.54**	**0.47**	**0.30**
5	**2**	**6**	**4**	**3**	**1**	Simple rank across PSs	**5**	**2**	**6**	**4**	**3**	**1**	Simple rank across PSs	**5**	**2**	**6**	**4**	**3**	**1**
19.93	**13.25**	**26.38**	**16.94**	**14.03**	**9.48**	Relative rank across PSs	**18.82**	**13.90**	**26.97**	**15.94**	**14.13**	**10.24**	Relative rank across PSs	**19.71**	**13.10**	**26.09**	**16.90**	**14.83**	**9.38**

WEIGHTED IMPORTANCE SCORES	HP	HS	SA	FA	LW	PU
Mean Score per PS across V1, V2 & V3, with Double Counting	0.61	0.42	0.83	0.52	0.45	0.30
Mean Score per PS for Scenario 4 across V1, 2 & 3, with Double Counting	0.67	0.44	0.85	0.49	0.53	0.37
Overall Importance Rank based on all Scenarios (6 = Greatest Need)	**5**	**2**	**6**	**4**	**3**	**1**
Implication for % Budget Allocation	**19.5**	**13.4**	**26.5**	**16.6**	**14.3**	**9.7**
Overall Importance Rank based on Scenario 4 (6 = Greatest Need)	**5**	**2**	**6**	**3**	**4**	**1**
Implication for % Budget Allocation	**20.0**	**13.2**	**25.3**	**14.7**	**15.7**	**11.1**

** / Rank scores are based on weighted scores values read to seven decimal places

KEY: 6 = GREATEST NEED, 1 = LEAST NEED

APPENDIX 4 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Half Bangladesh HP population deducted to remove double counting with LW.

Half Nepal HS population deducted to remove double counting with FA.

Half Nepal FA population deducted to remove double counting with HS.

Characterisation Criteria		Ref	Production Systems, Version 1					
			HP (1)	HS	SA (1)	FA (2)	LW (1)	PU
Land area (km^2)		1	521,307 **0.35**	278,927 **0.19**	1,505,332 **1.00**	374,472 **0.25**	153,362 **0.10**	0 **0.00**
Population		2	170,737,361 **0.69**	9,586,794 **0.04**	249,172,032 **1.00**	7,263,278 **0.03**	39,946,882 **0.16**	42,846,239 **0.17**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.17 **0.53**	1.67 **1.00**	4.00 **0.42**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.28**	0.15 **0.18**	0.03 **1.00**	0.11 **0.25**	0.21 **0.13**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.73**	96.67 **0.53**	183.33 **1.00**	183.33 **1.00**	80.00 **0.44**	0.00 **0.00**
	Land Productivity Potential	4b	4.00 **0.46**	2.17 **0.85**	2.00 **0.92**	1.83 **1.00**	4.50 **0.41**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,452 **0.72**	1,556 **0.67**	1,653 **0.64**	2,301 **0.46**	1,050 **1.00**	1,667 **0.63**
	Literacy Rate % (1997, weighted)	5b	51.31 **0.758**	49.96 **0.779**	54.60 **0.712**	49.75 **0.782**	38.90 **1.000**	54.63 **0.712**
	Harvard Scale Data (% children weight/height)	5c	56.30 **0.948**	63.42 **0.842**	55.40 **0.964**	55.78 **0.957**	57.00 **0.937**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,491 **0.03**	n/a **0.35**	1,885 **0.04**	77 **1.00**	n/a **0.35**	249 **0.31**
	NR Research Scientists (1991) per 1m population of PS	6c	10 **0.40**	n/a **0.68**	6 **0.67**	4 **1.00**	n/a **0.68**	6 **0.67**

Half Bangladesh LW population deducted to remove double counting with HP.

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Half Bangladesh HP population deducted to remove double counting with inland floodplain LW.

Half Nepal HS population deducted to remove double counting with FA.

Half Nepal FA population deducted to remove double counting with HS.

Half of Bangladesh inland floodplain population deducted to remove double counting with HP.

Characterisation Criteria		Ref	Production Systems, Version 2					
			HP (2)	HS	SA (2)	FA (1)	LW (2)	PU
Land area (km^2)		1	695,117 **0.31**	278,927 **0.12**	2,242,353 **1.00**	386,480 **0.17**	187,483 **0.08**	0 **0.00**
Population		2	260,798,296 **0.64**	9,586,794 **0.04**	407,632,645 **1.00**	10,358,275 **0.03**	49,026,939 **0.12**	42,846,239 **0.11**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.50 **0.48**	2.33 **0.71**	4.33 **0.38**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.29**	0.15 **0.19**	0.03 **1.00**	0.10 **0.28**	0.11 **0.26**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.67**	96.67 **0.48**	200.00 **1.00**	166.67 **0.83**	83.33 **0.42**	0.00 **0.00**
	Land Productivity Potential	4b	4.17 **0.44**	2.17 **0.85**	2.83 **0.65**	1.83 **1.00**	5.00 **0.37**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,502 **0.77**	1,556 **0.75**	1,644 **0.71**	2,157 **0.54**	1,160 **1.00**	1,667 **0.70**
	Literacy Rate % (1997, weighted)	5b	51.82 **0.776**	49.96 **0.804**	54.45 **0.738**	54.34 **0.740**	40.19 **1.000**	54.63 **0.736**
	Harvard Scale Data (% children weight/height)	5c	55.77 **0.957**	63.42 **0.842**	55.46 **0.963**	60.27 **0.886**	58.01 **0.920**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,889 **0.05**	n/a **0.42**	3,049 **0.05**	148 **1.00**	n/a **0.42**	249 **0.59**
	NR Research Scientists (1991) per 1m population of PS	6c	9 **0.67**	n/a **0.88**	6 **1.00**	7 **0.86**	n/a **0.88**	6 **1.00**

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORING OF PRODUCTION SYSTEM BY EACH CHARACTERISATION CRITERION

ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Population taken as rural except for Peri-Urban where total population was used.

Half Bangladesh HP population deducted to remove double counting with LW.

Half Nepal HS population deducted to remove double counting with FA.

Half Nepal FA population deducted to remove double counting with HS.

Characterisation Criteria		Ref	Production Systems Version 3					
			HP (1)	HS	SA (1)	FA (1)	LW (3)	PU
Land area (km^2)		1	521,307 **0.35**	278,927 **0.19**	1,505,332 **1.00**	374,472 **0.25**	124,149 **0.08**	0 **0.00**
Population		2	170,737,361 **0.69**	9,586,794 **0.04**	249,172,032 **1.00**	10,358,275 **0.04**	46,720,239 **0.19**	42,846,239 **0.17**
Market Feasibility	Road Density	3a	4.17 **0.40**	1.67 **1.00**	3.17 **0.53**	1.67 **1.00**	4.00 **0.42**	5.00 **0.33**
	Market Demand Assessment	3b	0.10 **0.28**	0.15 **0.18**	0.03 **1.00**	0.11 **0.25**	0.14 **0.20**	1.00 **0.03**
Potential	Assessment of Export Potential	4a	133.33 **0.73**	96.67 **0.53**	183.33 **1.00**	183.33 **1.00**	100.00 **0.55**	0.00 **0.00**
	Land Productivity Potential	4b	4.00 **0.46**	2.17 **0.85**	2.00 **0.92**	1.83 **1.00**	5.00 **0.37**	0.00 **0.00**
Poverty status (National data)	Average GDP (USD per annum per capita,1997)	5a	1,452 **0.72**	1,556 **0.67**	1,653 **0.64**	2,301 **0.46**	1,050 **1.00**	1,667 **0.63**
	Literacy Rate % (1997, weighted)	5b	51.31 **0.758**	49.96 **0.779**	54.60 **0.712**	49.75 **0.782**	38.90 **1.000**	54.63 **0.712**
	Harvard Scale Data (% children weight/height)	5c	56.30 **0.948**	63.42 **0.842**	55.40 **0.964**	55.78 **0.957**	57.00 **0.937**	53.38 **1.000**
NR Knowledge Base (National data)	% of GDP to Agricultural Research (1991) Weighted	6a	0.1539 **0.625**	n/a **0.719**	0.1545 **0.622**	0.0961 **1.000**	n/a **0.719**	0.1529 **0.629**
	NR Research Scientists (1991) per population of PS	6b	2,491 **0.03**	n/a **0.35**	1,885 **0.04**	77 **1.00**	n/a **0.35**	249 **0.31**
	NR Research Scientists (1991) per 1m population of PS	6c	10 **0.40**	n/a **0.68**	6 **0.67**	4 **1.00**	n/a **0.68**	6 **0.67**

Half Bangladesh inland LW population deducted to remove double counting with HP.

PU has markets but is restricted in comparative advantage for supply (see land productivity potential).

Characterisation criterion had to be scored manually to accommodate the averaged values.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORING

DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

WITH ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Production Systems. Version 1																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (2)			LW (1)			PU							
	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.35**	0.35	0.00	**0.19**	0.19	0.00	**1.00**	1.00	0.01	**0.25**	0.25	0.00	**0.10**	0.10	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.69**	0.69	0.27	**0.04**	0.04	0.02	**1.00**	1.00	0.39	**0.03**	0.03	0.01	**0.16**	0.16	0.06	**0.17**	0.17	0.07	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.59	0.09	**0.53**	0.76	0.11	**1.00**	0.62	0.09	**0.42**	0.27	0.04	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.28**			**0.18**			**1.00**			**0.25**			**0.13**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.73**	0.59	0.09	**0.53**	0.69	0.10	**1.00**	0.96	0.14	**1.00**	1.00	0.15	**0.44**	0.42	0.06	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.46**			**0.85**			**0.92**			**1.00**			**0.41**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.72**			**0.67**			**0.64**			**0.46**			**1.00**			**0.63**							
5b. Literacy rate % (1997, weighted)	**0.76**	0.81	0.12	**0.78**	0.77	0.11	**0.71**	0.77	0.12	**0.78**	0.73	0.11	**1.00**	0.98	0.15	**0.71**	0.78	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.95**			**0.84**			**0.96**			**0.96**			**0.94**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.03**	0.35	0.05	**0.35**	0.58	0.09	**0.04**	0.44	0.07	**1.00**	1.00	0.15	**0.35**	0.58	0.09	**0.31**	0.53	0.08	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.40**			**0.68**			**0.67**			**1.00**			**0.68**			**0.67**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 1									
Scenario 1 - Equal weighting on 3-6	**HP(1)**	0.58	**HS**	0.41	**SA(1)**	0.84	**FA(2)**	0.52	**LW(1)**	0.40	**PU**	0.29
Scenario 2 - Increased weighting on 3	**HP(1)**	0.55	**HS**	0.40	**SA(1)**	0.85	**FA(2)**	0.47	**LW(1)**	0.34	**PU**	0.25
Scenario 3 - Increased weighting on 4	**HP(1)**	0.60	**HS**	0.42	**SA(1)**	0.89	**FA(2)**	0.55	**LW(1)**	0.37	**PU**	0.22
Scenario 4 - Increased weighting on 5	**HP(1)**	0.64	**HS**	0.43	**SA(1)**	0.85	**FA(2)**	0.50	**LW(1)**	0.48	**PU**	0.37
Scenario 5 - Increased weighting on 6	**HP(1)**	0.55	**HS**	0.40	**SA(1)**	0.78	**FA(2)**	0.55	**LW(1)**	0.41	**PU**	0.32

FRACTIONAL SCORES RELATIVE TO GREATEST NEED

SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORING DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

WITH ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

	Production Systems. Version 2																		Weighting Scenarios				
	HP (2)			HS			SA (2)			FA (1)			LW (2)			PU							
For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.31**	0.31	0.00	**0.12**	0.12	0.00	**1.00**	1.00	0.01	**0.17**	0.17	0.00	**0.08**	0.08	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.64**	0.64	0.25	**0.04**	0.04	0.02	**1.00**	1.00	0.39	**0.03**	0.03	0.01	**0.12**	0.12	0.05	**0.11**	0.11	0.04	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.60	0.09	**0.48**	0.74	0.11	**0.71**	0.50	0.07	**0.38**	0.32	0.05	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.29**			**0.19**			**1.00**			**0.28**			**0.26**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.67**	0.55	0.08	**0.48**	0.66	0.10	**1.00**	0.82	0.12	**0.83**	0.92	0.14	**0.42**	0.39	0.06	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.44**			**0.85**			**0.65**			**1.00**			**0.37**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.77**			**0.75**			**0.71**			**0.54**			**1.00**			**0.70**							
5b. Literacy rate % (1997, weighted)	**0.78**	0.84	0.13	**0.80**	0.80	0.12	**0.74**	0.80	0.12	**0.74**	0.72	0.11	**1.00**	0.97	0.15	**0.74**	0.81	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.96**			**0.84**			**0.96**			**0.89**			**0.92**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.05**	0.45	0.07	**0.42**	0.67	0.10	**0.05**	0.56	0.08	**1.00**	0.95	0.14	**0.42**	0.67	0.10	**0.59**	0.74	0.11	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.67**			**0.88**			**1.00**			**0.86**			**0.88**			**1.00**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 2									
Scenario 1 - Equal weighting on 3-6	**HP(2)**	0.58	**HS**	0.43	**SA(2)**	0.84	**FA(1)**	0.48	**LW(2)**	0.40	**PU**	0.30
Scenario 2 - Increased weighting on 3	**HP(2)**	0.47	**HS**	0.34	**SA(2)**	0.77	**FA(1)**	0.36	**LW(2)**	0.27	**PU**	0.18
Scenario 3 - Increased weighting on 4	**HP(2)**	0.58	**HS**	0.42	**SA(2)**	0.86	**FA(1)**	0.50	**LW(2)**	0.36	**PU**	0.21
Scenario 4 - Increased weighting on 5	**HP(2)**	0.64	**HS**	0.45	**SA(2)**	0.85	**FA(1)**	0.46	**LW(2)**	0.48	**PU**	0.38
Scenario 5 - Increased weighting on 6	**HP(2)**	0.56	**HS**	0.42	**SA(2)**	0.80	**FA(1)**	0.51	**LW(2)**	0.42	**PU**	0.36

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORING

DERIVED WEIGHTED SCORES BY PRODUCTION SYSTEM AND CHARACTERISATION CRITERIA

WITH ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

	Production Systems, Version 3																		Weighting Scenarios				
	HP (1)			HS			SA (1)			FA (1)			LW (3)			PU							
For each PS, columns to the right specify relative score, mean relative score and weighted mean relative score (using Scenario 1 weights*) for each characterisation criterion	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Score	Mean	Weighted Mean	Scenario 1 Weights	Scenario 2 Weights	Scenario 3 Weights	Scenario 4 Weights	Scenario 5 Weights
CHARACTERISATION CRITERIA																							
1. Land area (km²)	**0.35**	0.35	0.00	**0.19**	0.19	0.00	**1.00**	1.00	0.01	**0.25**	0.25	0.00	**0.08**	0.08	0.00	**0.00**	0.00	0.00	0.01	0.01	0.01	0.01	0.01
2. Population	**0.69**	0.69	0.27	**0.04**	0.04	0.02	**1.00**	1.00	0.39	**0.04**	0.04	0.02	**0.19**	0.19	0.07	**0.17**	0.17	0.07	0.39	0.39	0.39	0.39	0.39
3. Marketing feasibility:																							
3a. Road density	**0.40**	0.34	0.05	**1.00**	0.59	0.09	**0.53**	0.76	0.11	**1.00**	0.62	0.09	**0.42**	0.31	0.05	**0.33**	0.18	0.03	0.15	0.3	0.1	0.1	0.1
3b. Market demand assessment	**0.28**			**0.18**			**1.00**			**0.25**			**0.20**			**0.03**							
4. Potential:																							
4a. Assessment of export potential	**0.73**	0.59	0.09	**0.53**	0.69	0.10	**1.00**	0.96	0.14	**1.00**	1.00	0.15	**0.55**	0.46	0.07	**0.00**	0.00	0.00	0.15	0.1	0.3	0.1	0.1
4b. Land productivity potential	**0.46**			**0.85**			**0.92**			**1.00**			**0.37**			**0.00**							
5. Poverty status (National data):																							
5a. Average GDP (USD per annum per capita,1997)	**0.72**			**0.67**			**0.64**			**0.46**			**1.00**			**0.63**							
5b. Literacy rate % (1997, weighted)	**0.76**	0.81	0.12	**0.78**	0.77	0.11	**0.71**	0.77	0.12	**0.78**	0.73	0.11	**1.00**	0.98	0.15	**0.71**	0.78	0.12	0.15	0.1	0.1	0.3	0.1
5c. Harvard scale data (% children weight/height)	**0.95**			**0.84**			**0.96**			**0.96**			**0.94**			**1.00**							
6. NR knowledge base (National data):																							
6a. % of GDP to Agricultural Research (1991) Weighted	**0.62**			**0.72**			**0.62**			**1.00**			**0.72**			**0.63**							
6b. NR Research Scientists (1991) per population of PS	**0.03**	0.35	0.05	**0.35**	0.58	0.09	**0.04**	0.44	0.07	**1.00**	1.00	0.15	**0.35**	0.58	0.09	**0.31**	0.53	0.08	0.15	0.1	0.1	0.1	0.3
6c. NR Research Scientists (1991) per 1m population of PS	**0.40**			**0.68**			**0.67**			**1.00**			**0.68**			**0.67**							
																			1.0	1.0	1.0	1.0	1.0

SCENARIOS FOR CRITERIA WEIGHTINGS	TOTAL WEIGHTED RELATIVE SCORE (ALL CRITERIA) BY PRODUCTION SYSTEMS, VERSION 3											
Scenario 1 - Equal weighting on 3-6	**HP(1)**	0.58	**HS**	0.41	**SA(1)**	0.84	**FA(1)**	0.52	**LW(3)**	0.42	**PU**	0.29
Scenario 2 - Increased weighting on 3	**HP(1)**	0.55	**HS**	0.40	**SA(1)**	0.85	**FA(1)**	0.48	**LW(3)**	0.37	**PU**	0.25
Scenario 3 - Increased weighting on 4	**HP(1)**	0.60	**HS**	0.42	**SA(1)**	0.89	**FA(1)**	0.55	**LW(3)**	0.40	**PU**	0.22
Scenario 4 - Increased weighting on 5	**HP(1)**	0.64	**HS**	0.43	**SA(1)**	0.85	**FA(1)**	0.50	**LW(3)**	0.50	**PU**	0.37
Scenario 5 - Increased weighting on 6	**HP(1)**	0.55	**HS**	0.40	**SA(1)**	0.78	**FA(1)**	0.55	**LW(3)**	0.42	**PU**	0.32

* / Scenario 1 is used as an example showing how the values for the total weighted scores of each scenario were generated.

FRACTIONAL SCORES RELATIVE TO GREATEST NEED
SHADED CELLS = AVERAGE IN LIEU OF SUITABLE DATA

APPENDIX 4 - RELATIVE SCORE SUMMARY

WEIGHTED IMPORTANCE SCORES SUMMARY BY PRODUCTION SYSTEM AND IMPLICATIONS FOR NRSP's BUDGET ALLOCATIONS

WITH ADJUSTED POPULATIONS FOR BANGLADESH (HP AND LW) AND NEPAL (HS AND FA)

Total score, sum for all criteria & PS ranking, V1**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V2**						Scenario Ref No.	Total score, sum for all criteria & PS ranking, V3**					
HP(1)	**HS**	**SA(1)**	**FA(2)**	**LW(1)**	**PU**		**HP(2)**	**HS**	**SA(2)**	**FA(1)**	**LW(2)**	**PU**		**HP(1)**	**HS**	**SA(1)**	**FA(1)**	**LW(3)**	**PU**
0.58 **5**	0.41 **3**	0.84 **6**	0.52 **4**	0.40 **2**	0.29 **1**	1	0.58 **5**	0.43 **3**	0.84 **6**	0.48 **4**	0.40 **2**	0.30 **1**	1	0.58 **5**	0.41 **2**	0.84 **6**	0.52 **4**	0.42 **3**	0.29 **1**
0.55 **5**	0.40 **3**	0.85 **6**	0.47 **4**	0.34 **2**	0.25 **1**	2	0.47 **5**	0.34 **3**	0.77 **6**	0.36 **4**	0.27 **2**	0.18 **1**	2	0.55 **5**	0.40 **3**	0.85 **6**	0.48 **4**	0.37 **2**	0.25 **1**
0.60 **5**	0.42 **3**	0.89 **6**	0.55 **4**	0.37 **2**	0.22 **1**	3	0.58 **5**	0.42 **3**	0.86 **6**	0.50 **4**	0.36 **2**	0.21 **1**	3	0.60 **5**	0.42 **3**	0.89 **6**	0.55 **4**	0.40 **2**	0.22 **1**
0.64 **5**	0.43 **2**	0.85 **6**	0.50 **4**	0.48 **3**	0.37 **1**	4	0.64 **5**	0.45 **2**	0.85 **6**	0.46 **3**	0.48 **4**	0.38 **1**	4	0.64 **5**	0.43 **2**	0.85 **6**	0.50 **3**	0.50 **4**	0.37 **1**
0.55 **5**	0.40 **2**	0.78 **6**	0.55 **4**	0.41 **3**	0.32 **1**	5	0.56 **5**	0.42 **2**	0.80 **6**	0.51 **4**	0.42 **3**	0.36 **1**	5	0.55 **5**	0.40 **2**	0.78 **6**	0.55 **4**	0.42 **3**	0.32 **1**
0.58	**0.41**	**0.84**	**0.52**	**0.40**	**0.29**	Mean Score per PS, across all scenarios	**0.57**	**0.41**	**0.82**	**0.46**	**0.39**	**0.29**	Mean Score per PS, across all scenarios	**0.58**	**0.41**	**0.84**	**0.52**	**0.42**	**0.29**
5	**3**	**6**	**4**	**2**	**1**	Simple rank across PSs	**5**	**3**	**6**	**4**	**2**	**1**	Simple rank across PSs	**5**	**2**	**6**	**4**	**3**	**1**
19.19	**13.49**	**27.58**	**16.98**	**13.19**	**9.57**	Relative rank across PSs	**19.24**	**14.04**	**28.07**	**15.75**	**13.13**	**9.77**	Relative rank across PSs	**19.03**	**13.37**	**27.35**	**17.00**	**13.76**	**9.49**

WEIGHTED IMPORTANCE SCORES	**HP**	**HS**	**SA**	**FA**	**LW**	**PU**
Mean Score per PS across V1, V2 & V3, adjusted	0.58	0.41	0.83	0.50	0.40	0.29
Mean Score per PS for Scenario 4 across V1, 2 & 3, adjusted	0.64	0.44	0.85	0.49	0.49	0.37
Overall Importance Rank based on all Scenarios (6 = Greatest Need)	**5**	**3**	**6**	**4**	**2**	**1**
Implication for % Budget Allocation	**19.2**	**13.6**	**27.7**	**16.6**	**13.4**	**9.6**
Overall Importance Rank based on Scenario 4 (6 = Greatest Need)	**5**	**2**	**6**	**3**	**4**	**1**
Implication for % Budget Allocation	**19.5**	**13.4**	**25.9**	**14.9**	**14.9**	**11.4**

** / Rank scores are based on weighted scores values read to seven decimal places

KEY 6: GREATEST NEED, 1 = LEAST NEED

The Natural Resources Systems Programme (NRSP), of the UK Department for International Development, undertakes research on the integrated management of natural resources. This encompasses the social, economic, institutional and biophysical factors that influence people's ability to both use and maintain the productive potential of the natural resource (NR) base over a relatively long timeframe. The intended outcome of the research is that NR-related strategies for improving people's livelihoods, that are of proven relevance to poor people, will be delivered in forms that could be taken up by the poor themselves and/or by development practitioners operating at a range of level's, from grassroots to senior policy level.

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