

Site selection guidance for Humidtropics— A CGIAR Research Program



RESEARCH
PROGRAM ON
Integrated Systems
for the Humid
Tropics

ILRI PROJECT REPORT

Site selection guidance for Humidtropics— A CGIAR Research Program

Alan Duncan,¹ Bernard Vanlauwe,² Jane Poole,³ An Notenbaert,⁴ Isabelle Baltenweck¹
and Jeannette van de Steeg¹

- 1 ILRI (International Livestock Research Institute)
- 2 IITA (International Institute of Tropical Agriculture)
- 3 ILRI–ICRAF (International Livestock Research Institute– World Agroforestry Centre)
- 4 CIAT (International Center for Tropical Agriculture)

May 2014

© 2014 International Livestock Research Institute (ILRI)



This publication is copyrighted by the International Livestock Research Institute (ILRI). It is licensed for use under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported Licence. To view this licence, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>. Unless otherwise noted, you are free to copy, duplicate or reproduce, and distribute, display, or transmit any part of this publication or portions thereof without permission, and to make translations, adaptations, or other derivative works under the following conditions:

- ① **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by ILRI or the author(s).
- ② **NON-COMMERCIAL.** This work may not be used for commercial purposes.
- ③ **SHARE ALIKE.** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar licence to this one.

NOTICE:

For any reuse or distribution, the licence terms of this work must be made clear to others.

Any of the above conditions can be waived if permission is obtained from the copyright holder.

Nothing in this licence impairs or restricts the author's moral rights.

Fair dealing and other rights are in no way affected by the above.

The parts used must not misrepresent the meaning of the publication.

ILRI would appreciate being sent a copy of any materials in which text, photos etc. have been used.

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo credit: Jo Cadilhon/ILRI

ISBN 92-9146-363-9

Citation: Duncan, A., Vanlauwe, B., Poole, J., Notenbaert, A., Baltenweck, I. and van de Steeg, J. 2014. *Site selection guidance for Humidtropics—A CGIAR Research Program*. Nairobi, Kenya: International Livestock Research Institute.

ilri.org

Better lives through livestock

ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: + 254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

Contents

Tables	iv
Figures	v
Introduction	1
Purpose of this document	2
Humidtropics hierarchy and action areas	2
Action site selection	3
Field site selection	4
Sampling process	8
Steps	8
Remaining questions...	8
References	10
Appendix 1	11
Appendix 2	13
Appendix 3	16
Appendix 4	17
Appendix 5	21
Appendix 6	22

Tables

Table 1. Action sites in each Tier I Action Area	4
Table 2. Field site domains	6
Table 3. Example of domain prioritization, as used for Mekong	7

Figures

Figure 1.	Humidtropics research level hierarchy	3
Figure 2.	Illustration of field site selection for East and Central Africa (ECA)	12
Figure A2.1.	Boundaries for Tier I Action Area in East Africa	13
Figure A2.2.	Boundaries for Tier I Action Area in Mekong	14
Figure A2.3.	Boundaries for Tier I Action Area in West Africa	14
Figure A2.4.	Boundaries for Tier I Action Area in Central America	15

Introduction

The CGIAR Research Program on Integrated Systems for the Humid Tropics, referred to as Humidtropics, seeks to transform the lives of the rural poor in the humid lowlands, moist savannas and tropical highlands in three major Impact Zones of sub-Saharan Africa and tropical America and Asia. The original proposal outlined the main criteria for Action Area selection, encompassing a range of social, political, and environmental heterogeneity contained within the humid tropics. Potential sites are initially limited in that they are restricted to the humid tropics, fall within established Action Areas, and have sufficient population densities to warrant attention.

As the Humidtropics proposal highlights, Candidate Action Sites were selected for Tier I Action Areas through a series of workshops during June 2012. Further adjustments may be based on the Systems Analysis and Synthesis under SRT I. This document provides general guidelines for Action Site selection across the different Action Areas.

An Introduction highlighting extracts from Humidtropics proposal and ECA example of the current realization of the above is provided in Appendix I.

Purpose of this document

This document is designed to provide guidance on site selection so that some commonality of approach is used across regions. Although the original proposal outlined the main criteria for Action Area selection, there was less detail on Action Site and none on a lower level where field research is most likely to be conducted (Field Site). Action Sites are large and we will not work everywhere (except through the Research for Development (R4D) platforms) and for baseline, regular evaluations etc. we cannot realistically sample the whole Action Site and hope to have accurate estimates of key indicators collected in these tools.

The main aim of this site selection process is to ensure that we capture the critical areas of variation, of importance to the program, across the humid tropic regions where Humidtropics will work, i.e. we do not want to ‘randomly’ miss a critical area of importance and/or focus too much attention on a single environment.

By a commonality of approach we endeavour to ensure that:

- Lessons can be learned across Action Areas
- IDO’s and M&E Indicators are measured consistently and in ‘known’ environments across Action Areas
- Evaluation of different research processes etc. occurs in a variety of environments (removes the danger of hundreds of ‘case-studies’)¹

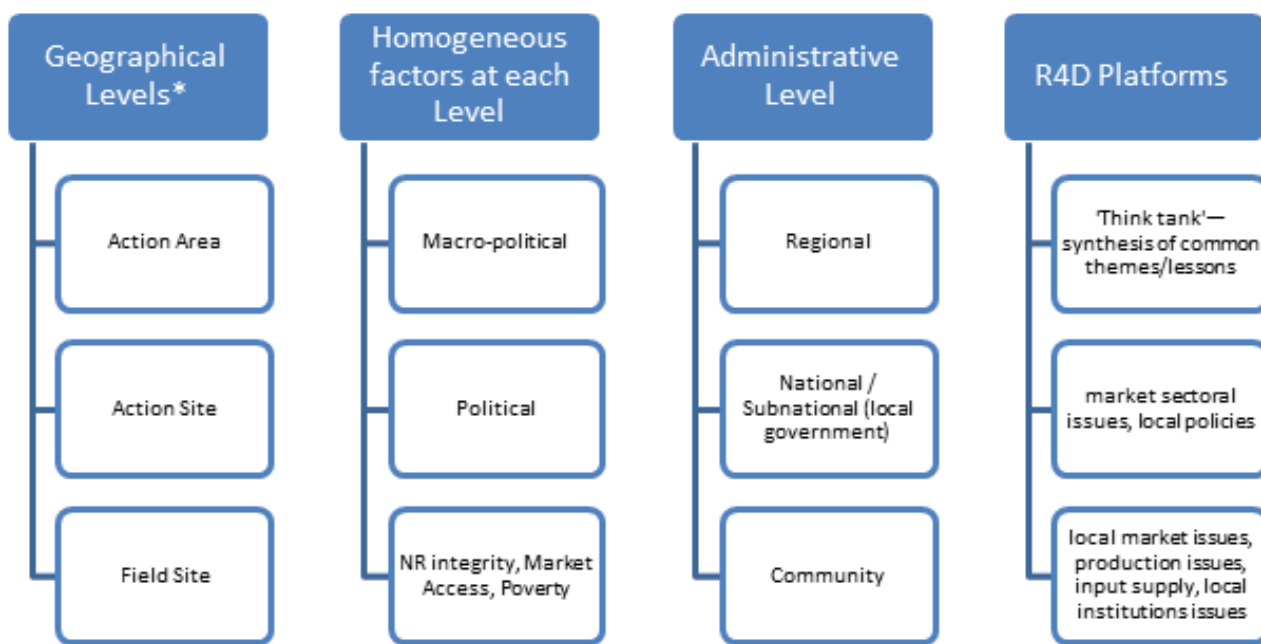
However, it should be noted that data originating from site selection (e.g. stratification variables—see below) and during any baseline activities are just one small part of the information and tools required for extrapolating beyond our research areas and/or projecting into the future. These will rely heavily on activities and learning cutting across the SRT’s, including *ex post* typologies and emerging understanding of key drivers at multiple scales.

Humidtropics hierarchy and action areas

The research hierarchy for implementation of Humidtropics activities is provided in Figure 1. An Action Area consists of a geographically well-defined area, cutting across different countries with selection criteria provided in the Humidtropics Proposal (Section 4.3.2–4.3.4, pp. 18–30). There are 11 Action Areas grouped into three tiers (Tier 1, 2, 3) depending on their current status of activities and timeline for action. The remainder of this document focuses on the initial Tier 1 Action Areas. Note our R4D platforms are a core diagnosis and implementation strategy for Humidtropics. Maps showing each Tier 1 Action Area are shown in Appendix 2.

1. Highest level is IMPACT ZONE (proposal Section 4.3.1).

Figure 1. Humidtropics research level hierarchy.



R4D platforms

Research for Development (R4D) platforms operate at each level of the hierarchy, Action Area, Action Site and Field Site. At the Area level they serve as a 'think tank' facilitating and assembling learning across the various Action Sites, including hypothesis testing. At the Action Site level they will likely focus on market sectoral issues and local policies, while at Field Site level aspects covered may include local institutional, market, production and input supply issues and the platform may look more like a classic Innovation Platform. It is recognized that given the inherent nature of R4D platforms with activities, focus and change driven by the stakeholders, a classic counter-factual ('control') is challenging to identify. Innovative methods will need to be used to identify comparable environments, at the different levels, to enable attribution of observed changes to Humidtropics activities.

Action site selection

The series of Action Sites within an Action Area should encompass the range of social, political, and environmental heterogeneity contained within the humid tropics. They should also cover the range of farming systems represented within the humid tropics of that Action Area. More detail on the original proposal Action Sites is shown in the proposal (Section 4.3.5, pp. 31–32).

There is no clear indication of comparable non-Humidtropics Action Sites for comparisons of key indicator changes (this should be found in a/the overall Impact Assessment and Learning Strategy), however, use of secondary data in other humid tropic areas of the world (not included in Humidtropics) or in Tier 2 and 3 action areas could be used to provide some evidence of attribution of changes to the Humidtropics program. Additionally, individual research activities at Field Site level may have counterfactual areas/populations.

Each Action Site is likely to have one R4D platform which will constitute the operational nucleus of the Humidtropics (note this is not finalized and may alter depending on the region). Within these R4D platforms entry points will be identified at a generic level and in line with system characteristics (e.g. intensification of cassava systems). More than one generic entry point could be identified in each Action Site

How to rationalize the current definition of action sites:

In the proposal there are inconsistencies in how Action Sites are defined in different Action Areas. In the Mekong and Central America and Caribbean (CAC), Action Sites include portions of 3 or 4 countries. In East and Central Africa (ECA) and West Africa (WA) Action Sites are portions of single countries (Table 1). Ideally, we would prefer some rationalization of Action Site definitions across the Program to start from a position of consistency, particular concerning the establishment of R4D platforms (there are some challenges if crosscountry platforms with differing national level policies, logical to have Action Sites with a clear-cut decision-making structure). However, there are justifications for the current design—for CAC, Trifinio represents an existing platform in which three countries work together, and the Haiti-DR border region already has some on-going initiatives and was selected to allow for crossborder learning. For Mekong it is suggested to consider each portion of a country to be a single Action Site. The current Action Sites would thus become 'Action Site clusters'. It may be necessary to reduce the number of Action Sites in Mekong to avoid overstretching, possibly by dropping one Triangle. If we proceed along these lines the main criterion distinguishing Action Sites would be political regime (except in CAC), which various members of the Humidtropics team have stated as being the optimum for R4D platform implementation. In addition, the later drawing of lessons should be more straightforward.

Table 1. Action sites in each Tier 1 Action Area

Tier 1 Action Area	Number of Action Sites	Action Sites
East and Central Africa (ECA)	6	W. Kenya, S. Uganda, Rwanda, Burundi, E. DRC, W. Ethiopia
Mekong	3 (Action Site Clusters)	Green Triangle, Development Triangle, Golden Triangle
Central America and Caribbean (CAC)*	3	N.C. Nicaragua, Trifinio, Haiti Dominican Republic
West Africa Humid Lowlands (WA)	4	Ghana, Côte d'Ivoire, S. Nigeria, Cameroon

* Characteristics of CAC Action Sites are shown in Appendix 3.

Field site selection

Field sites are defined by local R4D platforms and at the most appropriate scale at which such platforms would be effective. They are relatively large e.g. around 10–20,000 households, 100,000 people and defined as a specific level of country administration—e.g. *woreda* level in Ethiopia, division level in Kenya, district level in Dominican Republic, district level in Vietnam, and subprefecture level in Côte d'Ivoire (see Appendix 4). They bring together local government staff such as extension workers, local traders, researchers, community representatives, local NGO's etc. Within Field Sites the generic entry points identified at the Action Site level will be translated into specific entry points. Field Sites may be operated by different organizations under the overall leadership of the Action Site Coordinator.

Within Field Sites there may be a further layer defined as Experimental Sites—villages/communities where farm level work will happen. This lower level is likely to be defined by individual research activities and centre bilateral and partner projects linking to Humidtropics; an experimental site may only be used for a few years of the Program but the Field Sites remain constant over the initial 12 years of the Program.

The issue of comparable non-Humidtropics Field Sites to provide the with/without comparison for program outcomes and impacts is not clear from previous documentation. We suggest that there are three options for incorporating these in the design which could be used in conjunction with other methods for attributing program effects:

1. Specific research activities within a field site may have 'control' populations (e.g. villages, households within a village etc.) identified—i.e. with/without both in the same Field Site

2. During the Field Site selection process we will have identified many potential Field Sites (using both the spatial and other ‘soft’ criteria) but we only choose to work in a subset of these. Depending on resources and their similarities to selected Field Sites then these non-selected Field Sites could act as ‘controls’
3. Engagement in comparative project activities in the same domain or across domains within an Action Site so that we can draw on the strength of comparative analysis of independent cases.²

In order to select field sites we use a combination of spatial layers, ground-truthing of these with stakeholders, and ‘soft’ criteria.

Stratification—Why? What? How?

As our principle aim of site selection is to capture the variation across the Humidtropics regions we apply some stratification of certain key variables to ensure we do not randomly miss areas of interest. We use a combination of spatial criteria and ‘soft’ criteria during the site selection—although there are known limitations on the resolution and accuracy of spatial layers we believe they are realistic enough to provide this initial broad-brush differentiation of environments (called ‘domains’ for simplicity). Later work on SRT I Situational Analysis will enlarge our site characterization, incorporate many additional aspects of both the spatial and non-spatial environment and contribute another element to future extrapolation and projection of program results.

More specifically we use stratification of the areas into *domains* to try and:

- Ensure representativeness (and inclusiveness) of where we are working—covering the *domains* of importance to Humidtropics;
- Enable analysis, lesson learning etc. within ‘domains’;
- Avoids the potential of sampling errors when establishing baseline indicators (i.e. accidentally not capturing the diversity of households / environments, that when weighted will provide site level indicators);
- Provide some coarse homogeneity of certain key characteristics;
- Test the robustness and scalability of interventions both within and across *domains* (if appropriate);
- Identify others areas within / between the Action Site and Area that are represented by each *domain* (i.e. representativeness of the Field Site, potential for out-scaling).

Input was requested from many of the Humidtropics team as to what stratification variables should be applied. Ideally, we wanted to incorporate both the overall target population for Humidtropics (i.e. poor people) and the focus system elements of SRT 2 (i.e. systems productivity (SRT2.2), natural resource management (SRT2.3), market and other institutions (SRT2.1)). An analysis of potential variables to use for each of these elements was carried out (see embedded document in Appendix 5)

In order not to over-complicate the interactions, three socio-economic and biophysical layers were used, which together provide a good explanatory power in predicting the type of agricultural enterprises and development pathways encountered in different rural communities, as the layers are strongly related to the feasibility and attractiveness of specific development and livelihood strategies. The three layers relate to: poverty, market access and natural resource integrity. The measure for natural resource integrity provides information on natural resource management as well on systems productivity:

Poverty: The HarvestChoice team in collaboration with CIAT extracted subnational poverty prevalence rates from nationally representative household surveys conducted in various years (Wood et al. 2010). The HarvestChoice Poverty maps (and related study) were commissioned by the CGIAR Strategy Results and Framework Team and

2. From ‘Very tentative first ideas’ of N. Röling based on the Humidtropics Research Design.

produced through contributions from the International Centre for Tropical Agriculture (CIAT), the Centre for International Earth Science Information Network (CIESIN), the International Food Policy Research Institute (IFPRI), and the World Bank.

Market access: The Market Influence Data is a global dataset on various market accessibility indicators (access to national and international markets index, two indices of market influence, one by combining national GDP data directly with the access index, and the other by downscaling national GDP using a measure of economic density) (Verburg et al. 2011).

Natural resource integrity: The amount and quality of available data on environmental conditions is growing fast, making it difficult to select a proper threshold that captures the various forms of natural resource integrity. As Humidtropics will guide diagnostics of natural resource degradation and aims for improved natural resource integrity through site-specific responses to it, we utilize a data layer showing those areas where human's influence on natural production is largest. Net Primary Production (NPP) is the net amount of biomass produced each year by plants; it is a major indicator for trophic energy flows in ecosystems. The Global human appropriation of net primary production (HANPP) is determined for the year 2000, based on vegetation modelling, agricultural and forestry statistics, and geographical information systems data on land use, land cover and soil degradation that localizes human impact on ecosystems (Haberl et al. 2007).

The problem with these layers is that they are all heavily influenced by population density. However, we believe that these layers potentially provide good explanatory power in identifying the type of agricultural enterprises and development pathways encountered in different rural communities. Similar to the study of Wood et al. (1999), using population density, agricultural potential and market access, the utilized layers are strongly related to the feasibility and attractiveness of specific development and livelihood strategies.

In order not to over-complicate the number of combinations (domains), we use two levels for each of the three variables giving a total of 8 domains (Table 2). **Note that the thresholds for each variable (High/Low) may vary depending on local context and should be decided by the team and partners in each region.**

Table 2. Field site domains

Variable	Domains							
	HHH	HHL	HLH	HLL	LHH	LHL	LLH	LLL
Poverty	High	High	High	High	Low	Low	Low	Low
Market	High	High	Low	Low	High	High	Low	Low
Natural resources	High	Low	High	Low	High	Low	High	Low

Potential 'soft criteria' suggested by Humidtropics team include the following:

- Partners—presence and capacity
- On-going research activities (CG centres and partners)
- Proximity and comparability to other long-term research sites
- Institutional actor presence (e.g. public, private, NGO extension, cooperatives, markets etc.) and networks
- Resource availability

(N.B. These could form a minimum checklist and to a certain extent could be quantitative in nature):

Number of sites and ‘Size’

The number and size of sites will depend largely on the resources available, the ‘soft’ criteria and the entry-points and interventions within each Action Area and Site. The guidance given in this document is suggestions to ensure representativeness, replication and to increase comparability across all levels of the research hierarchy. However, each Action Area should work through the process of identifying their priority *domains* and appropriate scale of research activities.

Assuming the need for some replication and also that some domains may not be prioritized and/or not exist, it is proposed that the final target number of field sites should be **2–3 replications of each domain in each Action Site** accepting that the actual number is likely to be much less than this as commonly not all *domains* will be present and/or prioritized. Capturing as many prioritized *domains* as possible within an Action Site is preferable but further discussion and agreement is needed to align the definition of an Action Site across Action Areas (Table 1).

It may also be useful for Humidtropics research that, in some cases, Field Sites from different *domains* are clustered within an administrative area, allowing other important variables such as policy environment, higher level entry-points, farmers systems, agro-ecological potential etc. to remain constant.

Using Appendix 6 we propose to maintain a database of sites in order to identify domains which may be under or over-represented in the Action Areas; adding ‘soft’ criteria to this database will provide additional detail of the sites.

Above we referred to **existing and prioritized domains**:

- For the existing we may consider setting a minimum threshold where a *domain* will NOT be included for field activities, e.g. if it represents $< 2-5\%^3$ of the total Action Site / Action Area population;
- For prioritization then Action Area teams may see some *domains* as being more important for focus because, for example, they cover a majority of the target population and/or they indicate an area that highly relates to key entry-points identified. The table below gives an example prioritization from Mekong (Table 3).

Table 3. Example of domain prioritization, as used for Mekong

Ranking of domain categories using combinations of poverty, market and natural resource (in that order)		
HHH	High priority	High levels of poverty and degradation risk presents combined threat, and good market access provides an opportunity for change but also possible threat
HHL	High priority	High levels of poverty and good market access provide an opportunity for change, few environmental risks
HLH	High priority	Perfect storm of the biggest challenges—poverty, poor markets and degradation risk
HLL	Lower priority	Poor people in remote areas presenting little threat to environment may not present good opportunity for change or growth
LHH	High priority	Not the poorest areas, but risk of degradation and good markets makes action necessary and possible
LHL	Low priority	These areas are in good shape—not so poor, good markets, few environmental risks. May not need help now
LLH	High priority	Risk of degradation again, this time with less market access
LLL	Low priority	Also in good shape, although with less market access

3. Note that in an Action Area we may ‘estimate’ that $100\% / 8 = 12.5\%$ of each Area will be under domain X. Hence we should set the threshold for exclusion lower than this.

The ‘size’ of a Field Site should enable a level of comparison between *domains* and impacts of interventions. In most cases this would imply a common size based on population or area—previous communications from Humidtropics members suggested this would be 10–20,000 households or 100,000 people. However, to some extent the size should also consider the system elements being researched and what level this should be appropriately assessed. For simplicity it is likely that the size of a Field Site will be defined by an administrative unit (e.g. for CAC this could be Municipality), Appendix 4.

Sampling process

A first step is to define the boundaries of Action Sites within an Action Area. Next, spatial layers are used to suggest potential locations of Field Sites across all Action Sites in each Action Area for each *domain*. For this we use the spatial layers that comprised the domains:

- Poverty (and Population Density for comparison)—HarvestChoice Poverty Maps (threshold e.g. 35%)
- Markets and Other Institutions / Access (SRT 2.1)—Market Influence Data (threshold e.g. 0.1)
- Natural Resource Management / Integrity (SRT 2.3)—Global human appropriation of net primary production (HANPP) (threshold e.g. 20%)

Thresholds are likely to be different depending on the country, region etc. but the process for setting the threshold should be the same (e.g. for market access can use local definitions based on common mode of transport etc.).

Steps

- Action Area co-ordinators define Action Site boundaries and these are passed to ILRI for digitizing;
- ILRI produces maps using global data layers for the above variables—some discussion and tentative agreement on thresholds will ensure that the most useful maps can be presented in the next step;
- These maps provide an initial indication of potential location of Field Sites for review at Action Area meetings and are refined at Action Site meetings;
- Action Area teams together with local stakeholders and experts confirm what the spatial information says (ground-truthing), adapt the thresholds if required and incorporate the ‘soft criteria’;
- Together the above steps form an iterative process with the final output being the final section of Field Sites in each Action Site and Action Area. These may include also a time element if teams plan to stagger initiation of research activities.

Remaining questions...

How does this design and protocol relate to SLO’s?

- Improved Natural Resource (NR) status (indicator NRI)
- Reduced poverty (indicator Poverty)
- Increased food security (indicators poverty, NRI and market access)
- Improved nutrition (indicators poverty and market access)

How does agro-ecology or ‘farming system’ feature in the site selection process?

Although East and Central Africa Action Site selection appear to be based on this we think that our classification variables are equally important so this ‘farming system’ element is likely an additional element (in some cases a confounder with other criteria but in others the same farming system may occur in different domains?)

References

- Haberl, H.E., Krausmann, K.-H., Gaube, F., Bondeau, V., Plutzer, A., Gingrich, C., Lucht, S.W. and Fischer-Kowalski, M. 2007. Quantifying and mapping the global human appropriation of net primary production in Earth's terrestrial ecosystem. *Proceedings of the National Academy of Sciences of the USA* 104(31):12942–12947.
- Verburg, P.H., Ellis, E.C. and Letourneau, A. 2011. A global assessment of market accessibility and market influence for global environmental change studies. *Environmental Research Letters* 6:3(4)019.
- Wood, S., Hyman, G., Deichmann, U., Barona, E., Tenorio, R., Guo, Z., Castano, S., Rivera, O., Diaz, E. and Marin, J. 2010. Subnational poverty maps for the developing world using international poverty lines: Preliminary data release.
- Wood, S., Sebastian, K., Nachtergaele, F., Nielsen, D. and Dai, A. 1999. *Spatial aspects of the design and targeting of agricultural development strategies*. EPTD Discussion Paper 44. International Food Policy Research Institute (IFPRI): Washington, DC, USA.

Appendix I

Proposal extracts (as extracted by Eric Koper)

1. All Action Areas contain different countries
2. Action Sites must encompass the range of social, political, and environmental heterogeneity contained within the Humidtropics.
3. Action Sites will thus be covering representative farming systems. Within these, field sites will be chosen to cover the existing variation in poverty, natural resource integrity, and market access of the Action Area.⁴
4. Action Sites with similar characteristics and potentials may be replicated within an Action Area to allow stronger analysis of results.
5. In conclusion, the exact number of Action Sites within an Action Area will likely vary between three and five per Action Area. Action Sites can either contain contrasting population densities, market access, poverty levels, and natural resource integrity, or differ between them but must be arranged in a manner permitting statistical analysis.⁵

ECA example⁶ showing current realization of the above

For ECA the proposal gave the following example based on the Nairobi 2012 workshop. Stratification here is by domain at Field Site level with a different form of stratification used at the Action Site level ('farming system').

East and Central Africa action site selection (with some embellishments from Alan Duncan)

Four candidate action sites were proposed corresponding to major farming systems: Kivu (Root Crop + Legume mixed cropping system), Central Uganda (Matoke, Banana + mixed food crop system), Western Kenya (Maize-based mixed food crop system, Western Ethiopia (transect from lowland, root–cereal crops, to highland tuber–cereal crops, mixed with livestock along the way). Because of their location in different countries these sites also vary in political backdrop.

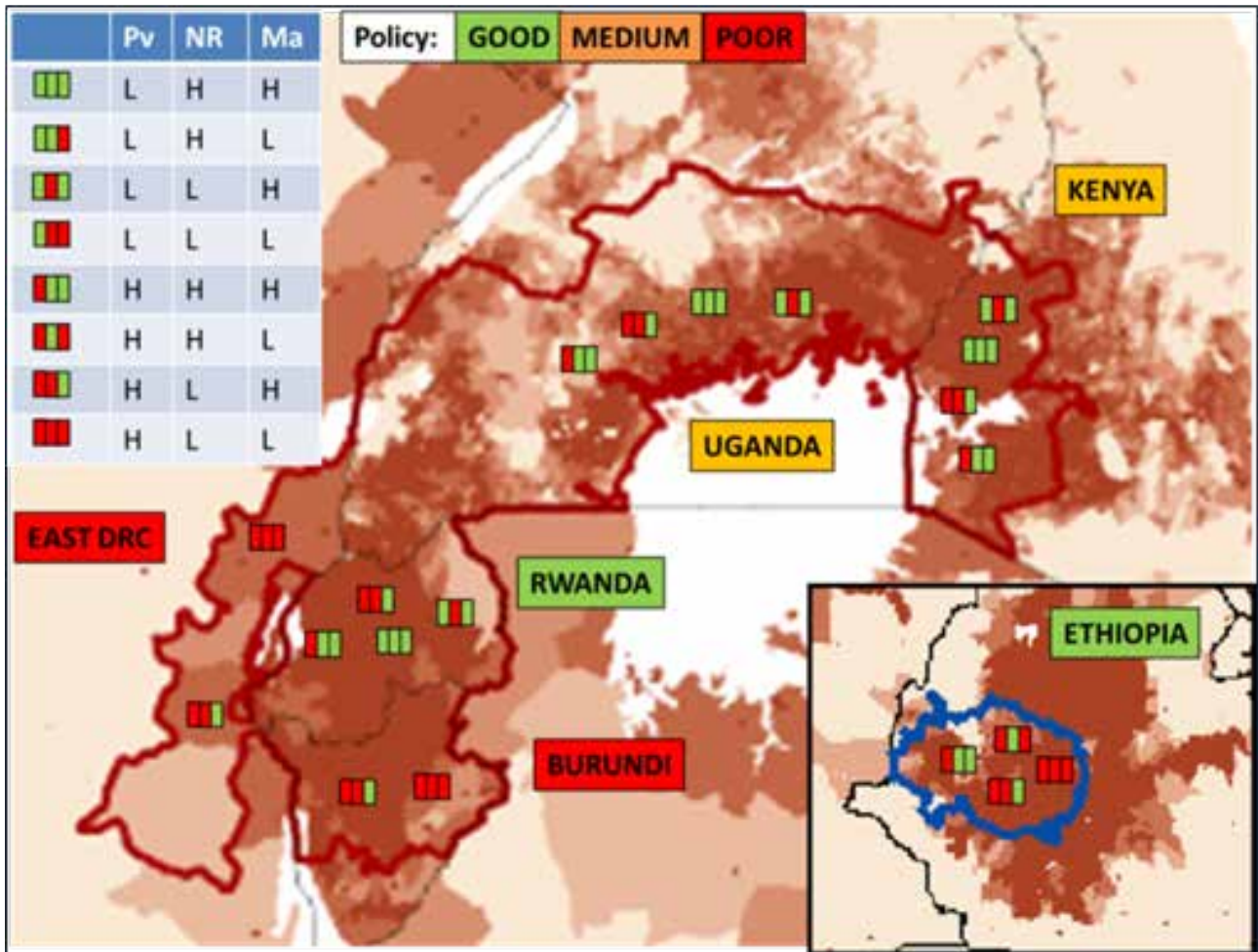
4. For ease of comprehension in the remainder of this document we call the combination of market access, poverty and natural resource integrity a DOMAIN.

5. Point 5 is quite critical (although we would delete the 'statistical analysis'—is rather 'replication and representativeness')—it implies that Action Sites could EITHER be stratified according to market access (MA), poverty (PV) and natural resource integrity (NR) domain AND/OR not stratified and the stratification applied at a lower level (Field Sites).

6. This was originally developed by Bernard Vanlauwe with inputs from An Notenbaert and others at ILRI.

For field site selection a stepwise approach is used based upon binary thresholds of poverty, resource integrity and market access (total of 8 possible classes). Assuming the need for some replication and also that some classes will not exist, it is proposed that in each Action Area the target number of field sites should be 24 (3 replications of each domain) accepting that the actual number may be less than this. Field sites are identified that capture the diversity of conditions within the four Action Sites. Similar sets of conditions across sites provide the opportunity to test the scalability robustness of interventions across the Area. A map and table resulting from this process appears in Appendix 3 (Section 18) of the proposal and is reproduced in Figure 2.

Figure 2. Illustration of field site selection for East and Central Africa (ECA).



Appendix 2

Figure A2.1. Boundaries for Tier 1 Action Area in East Africa.

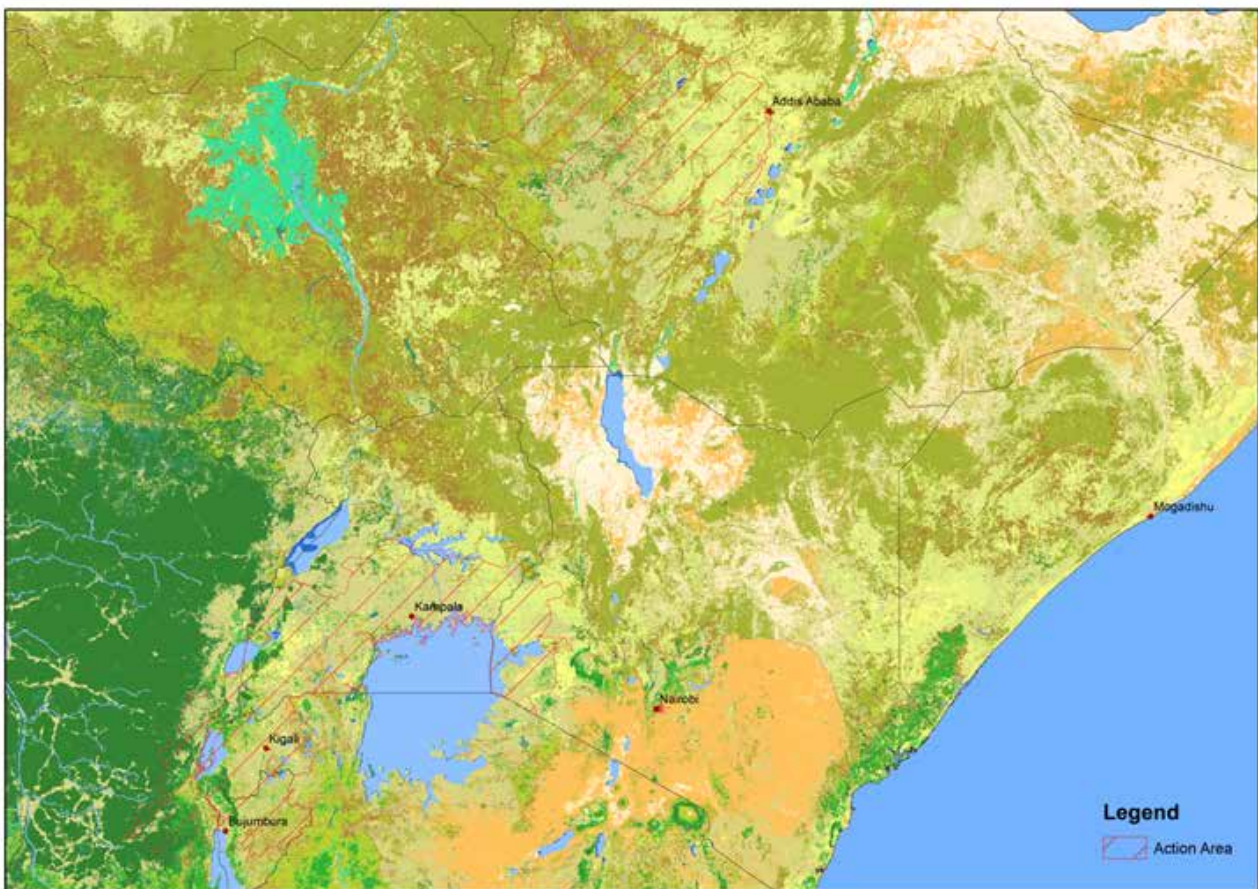


Figure A2.2. Boundaries for Tier I Action Area in Mekong.

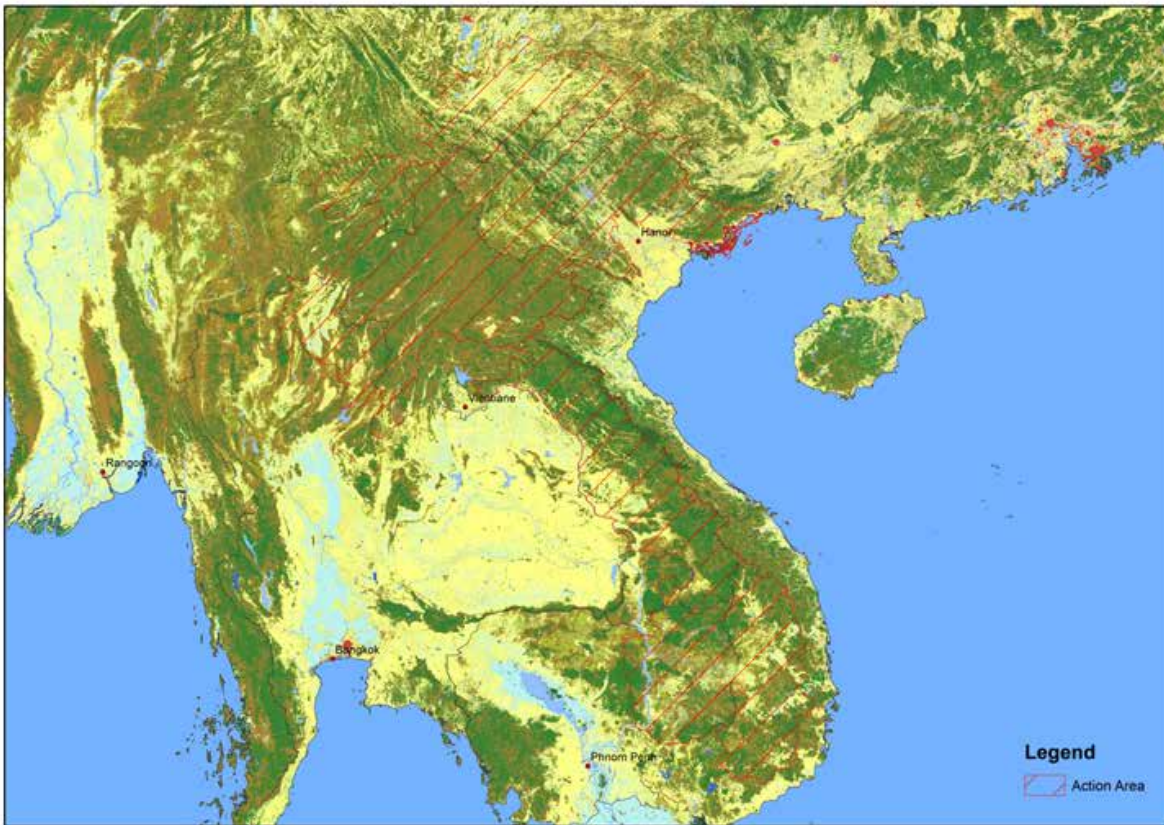


Figure A2.3. Boundaries for Tier I Action Area in West Africa.

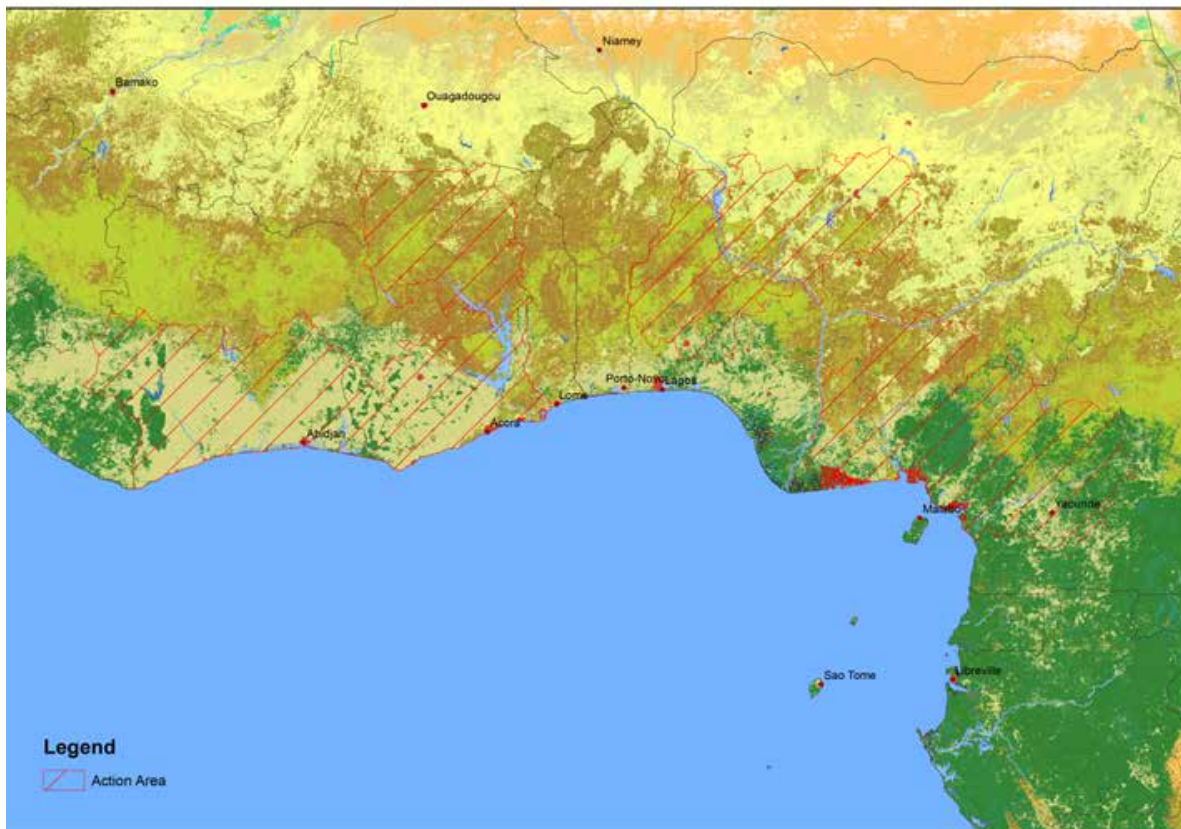


Figure A2.4. Boundaries for Tier I Action Area in Central America.



Appendix 3

Characteristics of Action Sites in Central America and Caribbean (CAC)

Action site	Natural resource integrity	Poverty	Market access
Northern Nicaragua	Gradient from long-term degraded lands in mixed crop–livestock systems to short-term degradation mainly due to deforestation for crop and livestock production	Quite evenly distributed	Gradient from good (Pacific) to poor or absent infrastructure (Atlantic)
Trifinio	Quite evenly distributed	Quite evenly distributed	Quite evenly distributed
Haiti-DR	Very strong contrast between both countries	Strong contrast between and within both countries	Strong contrast between both countries

Appendix 4

Hierarchy of administrative districts in Humidtropics Action Sites showing area and population at different levels to inform decisions on the level at which Research for Development platforms would be established across Action Sites.

Average size and population of administrative units within Action Area, for countries in Latin America

	Area (km ²)			Total population (1000)		
	Mean	Min	Max	Mean	Min	Max
Dominican Republic						
admin level 1 (District)	1 139	4	3252	121	0	780
admin level 2 (Municipality)	231	1	1680	25	0	307
Guatemala						
admin level 1 (Department)	1383	55	6942	300	7	2397
admin level 2 (Municipality)	129	1	1170	28	0	345
Honduras						
admin level 1 (Department)	2564	2	7783	234	0	1094
admin level 2 (Municipality)	215	1	2252	20	0	546
Haiti						
admin level 1 (Department)	1485	104	3381	292	22	540
admin level 2 (Unknown)	424	13	1896	83	2	401
admin level 3 (Unknown)	168	6	591	33	1	186
Nicaragua						
admin level 1 (Department)	4392	2	12,609	166	0	441
admin level 2 (Municipality)	656	2	4825	25	0	123
El Salvador						
admin level 1 (Department)	667	2	1924	368	0	1964
admin level 2 (Municipality)	52	1	639	29	0	451

Average size and population of administrative units within Action Area, for countries in West Africa

	Mean	Area (km ²)		Mean	Total population (1 000)	
		Min	Max		Min	Max
Benin						
admin level 1 (Department)	16,658	9822	23,494	470	327	614
admin level 2 (Commune)	2776	423	6559	78	35	176
Côte d'Ivoire						
admin level 1 (Region)	11,079	5446	22,771	907	371	3870
admin level 2 (Department)	4236	1473	9950	347	93	3609
admin level 3 (Subprefecture)	1470	112	5531	120	14	2808
Cameroon						
admin level 1 (Province)	25,419	12,272	60,211	1618	1088	2071
admin level 2 (Department)	3631	230	23,131	231	9	1334
Ghana						
admin level 1 (Region)	18,105	3247	62,410	1601	67	3377
admin level 2 (District)	1393	23	8797	123	1	1441
Nigeria						
admin level 1 (State)	18,412	4050	64,056	2751	1652	4711
admin level 2 (Local Authority)	870	15	9331	130	9	595
Togo						
admin level 1 (Region)	11,107	10,372	11,842	604	565	644
admin level 2 (Prefecture)	2468	403	6810	134	49	323

Average size and population of administrative units within Action Area, for countries in East Africa

	Mean	Area (km ²)		Mean	Total population (1000)	
		Min	Max		Min	Max
Burundi						
admin level 1 (Province)	1005	14	1828	294	3	523
admin level 2 (Commune)	140	1	463	41	0	106
admin level 3 (Colline)	7	0	363	2	0	69
admin level 4 (Sous colline)	2.459	0	363	1	0	69
DRC						
admin level 1 (Province)	26,650	26,650	26,650	3073	3073	3073
admin level 2 (Subregion)	8883	262	18,028	1024	217	1517
admin level 3	2221	4	9380	256	0	688
Ethiopia						
admin level 1 (Region)	37,203	8045	92,261	4078	70	9118
admin level 2 (Zone)	12,401	670	21,718	1359	70	2689
admin level 3 (Woreda)	997	61	2597	109	11	335
Kenya						
admin level 1 (Province)	7204	461	13,866	2443	94	4143
admin level 2 (District)	1351	22	5861	458	4	1203
admin level 3 (Division)	277	0	3114	94	0	275
admin level 4 (Location)	73.51	0	3114	25	0	181
admin level 5 (Sublocation)	22	0	3114	7	0	181
Rwanda						
admin level 1 (Prefecture)	2189	1432	4099	712	462	1115
admin level 2 (Commune)	154	31	1648	50	26	193
Tanzania						
admin level 1 (Region)	22	16	28	2545	2295	2794
admin level 2 (District)	15	7	21	1696	626	2295
admin level 3 (Division)	4	0	18	509	66	1807
Uganda						
admin level 1 (District)	1889	4	8659	354	0	1058
admin level 2 (County)	745	1	3297	139	0	1058
admin level 3 (Subcounty)	126	1	1541	24	0	243
admin level 4 (Parish)	23	0	1182	4	0	64

Average size and population of administrative units within Action Area, for countries in Mekong

	Mean	Area (km ²)		Total population (1000)		
		Min	Max	Mean	Mean	Mean
Cambodia						
admin level 1 (Province)	15,461	14,550	17,253	172	46	390
admin level 2 (District)	2577	250	6756	29	4	117
admin level 3 (Commune)	404	5	2952	4	0	19
Laos						
admin level 1 (Province)	15,661	7676	25,388	340	86	954
admin level 2 (District)	2030	311	5161	44	3	214
Vietnam						
admin level 1 (Region)	59,825	41,119	69,792	5975	2620	10,027
admin level 2 (Province)	8974	3871	21,162	896	307	1923
admin level 3 (District)	875	33	3984	87	4	349
admin level 4 (Commune)	54	1	2120	5	0	44

Appendix 5

Evaluation of spatial stratification variables is discussed in the linked document:

<https://cgspace.cgiar.org/handle/10568/45976>

Appendix 6

Template for selected action sites and (initial) field sites within each action area

Action area	Action site	Administrative units in Action Site	Field site	Name of field site administrative unit	Market access domain (hi or lo)	Poverty domain (hi or lo)	NR integrity domain (hi or lo)
East and Central African highlands	Western Kenya						
Central Mekong							
Western humid lowlands							
Central America and Caribbean							

ISBN 92-9146-363-9



The International Livestock Research Institute (ILRI) works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a member of the CGIAR Consortium, a global research partnership of 15 centres working with many partners for a food-secure future. ILRI has two main campuses in East Africa and other hubs in East, West and Southern Africa and South, Southeast and East Asia. ilri.org



CGIAR is a global agricultural research partnership for a food-secure future. Its science is carried out by 15 research centres that are members of the CGIAR Consortium in collaboration with hundreds of partner organizations. cgiar.org