Participatory systems put farmers' knowledge into research

RIU

Validated RNRRS Output.

A participatory process in Ghana is developing technologies with key input from end users. Participatory technology development (PTD) is helping to convert current land use—based on growing crops in rotation with bush-fallow—into more productive systems. The PTD method incorporates farmers' local ecological knowledge about fallows into designs that fit in with local tenure rules and farming practices. It's also behind two pilot decision-support tools. These garner locally appropriate information, to improve the way fallows are managed in West and Central Africa, and to produce custom extension materials that aim to boost yields in cocoa-based farming systems. The PTD method is currently being used in Ghana, while the decision-support tools (that are available from several websites) are used internationally, including in the West Indies, Venezuela and Mali.

Project Ref: **NRSP20:**
Topic: **6. Promoting Success: Partnerships, Policy & Empowerment**
Lead Organisation: **University of Wales, Bangor, UK**
Source: **Natural Resources Systems Programme**

Document Contents:

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Ghana,

Target Audiences for this content:

Crop farmers, Livestock farmers, Fishers, Forest-dependent poor,

Description

NRSP 20

A. Description of the research output(s)

1. Working title of output or cluster of outputs:

Integration of participatory technology development into research and extension

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.:

Natural Resources Systems Programme (NRSP)

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R7446

Institutional partners: University of Wales, Bangor (UWB), Forestry Research Institute of Ghana (FORIG), the International Institute of Tropical Agriculture (IITA), the Ministry of Agriculture, Agroforestry, Land and Water Management Division (MOFA) and the Ghana Organic Agriculture Network (GOAN)

*4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? **(max. 400 words)**. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

The objective of the project was to develop land use strategies to convert shortening bush-fallow rotations into sustained and more productive systems, through the process of participatory technology development, by incorporating farmers' indigenous ecological knowledge of management of the fallow into designs sensitive to local tenurial and cultural practices. The project was expected to contribute to the more general purpose of the development and promotion of strategies to secure the livelihoods of poor people dependent on agricultural systems near the receding forest margin.

Three sets of output were developed from R7446 namely i) a Participatory Technology Development (PTD) Methodology; ii) four fallow productivity improvement technologies; and iii) two pilot decision support tools that garner locally appropriate information to improve management of fallows for West and Central Africa, and produce customised extension materials (in local languages) for increasing the productivity of cocoa-based production systems.

Output	Description of Output	Problem to address	Period produced
PTD methodology	A **participatory process** for developing technologies with end users	Inadequate institutional capacity for **participatory research**	2000-2003

Improved fallow technologies	A range of interventions for the improvement of bush fallows developed and tested in **participation** with three farming communities	• Declining **soil fertility** • Short land **tenure** • No opportunity to fallow • Increase in **weeds** • Declining availability of forest and long fallows • Need for long fallow for good yields of plantain and income • Declining **cocoa** yields because of varietal drift and pest/disease problems • Need for income (wood production for sale)	2000-2003
Pilot **decision support tools** -LEGINC -LEXSYS	**Pilot decision-making** tools incorporating scientists', farmers' and the research experience one that can be widely used throughout the tropics and sub-tropics the other to customise technology choices within Ghana	General recommendations for use of components (**legumes**) and **technology packages** (integration of legumes into **farming systems**) are not relevant to local circumstances. Means are required to select and customise information relevant to particular local circumstances.	2002-2003

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
x	*x*		*x*		

*6. What is the main **commodity** (ies) upon which the output(s) focused? Could this output be applied to other commodities, if so, please comment*

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
			x				*x*

8. What farming system(s) does the output(s) focus upon?
Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
x			*x*	*x*		

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Unlike crop varieties or new seeds, which are either adopted or rejected, fallow management interventions are management-oriented technologies which require adaptation to the new environments. In, for example, the testing of new seed varieties, the farmers do not provide the innovation which has resulted in the improved variety, but select the innovation that has been generated by the process (crossing) and experiment with genotype and environment interactions. In the case of fallow management interventions, PTD is more difficult because the need for invention makes the process less predictable. Any further development should be process-oriented allowing changes to be made as they progress, to enable adaptation of management options to local environments and situations. The emphasis must therefore be on the product *and* the process in generation and diffusion of the technologies. This, therefore, cuts across many other clusters of outputs which seek to disseminate complex processes which incorporate specific scientific interests and farmer participation. These could include: **soil management in lowland maize systems; soil and water management; participatory irrigation management and PTD; integration of PTD into research and extension; methods of economic and environmental assessment of NRM; integration of indigenous and biological knowledge**

The approach adopted in developing decision support tools to select and customise information on components and technologies relevant to particular local circumstances is of generic value in agricultural and forest extension and could be applied to many RNRRS outputs. Groundwork in NRSP project R7516 proposed tools and institutional frameworks for incorporating local contexts within national research systems that provide a platform to take the present outputs forward. LPP project R7637 has outputs for customising extension materials on tree fodder to local circumstances that shares some of the methodological elements for combining local and scientific knowledge used in LEXSYS and LEGINC. A project to develop tools to support 1) integration of local knowledge in research planning 2) facilitate exchange of local and scientific knowledge in national research and extension programmes and 3) production of customised extension materials for local circumstances could be very productive in getting results of RNRRS research into use.

Validation

B. Validation of the research output(s)

*10. **How** were the output(s) validated and **who** validated them*? (500 words)

a. Methods used for the validation/evaluation/assessment by the one doing this exercise

By the nature of the participatory technology development (PTD) approach used in the project, the validation of the outputs took place in an iterative manner as the outputs were being produced through a number of participatory monitoring and evaluation methods built into the project (see McDonald *et al*, 2003, Obiri, 2003). The research farmers of the three research sites engaged in the research made observations and records of their research and innovation to validate the effectiveness of the interventions. The on-farm experiments were monitored by researchers and farmers at the start of each planting season, mid-way through the cropping cycle, and at harvest and any modifications iteratively built into the next season's trials. . Quantitative assessments were conducted with participating farmers at the end of each season and an open-ended questionnaire interview of individual participating farmers was first conducted before following up with group discussions in village meetings. Stakeholder meetings were conducted on an annual basis, and all outputs were evaluated in a terminal workshop in October, 2003 where all participants trialled the decision support tools.

Further validation was achieved after project completion. The three set of outputs developed from R7446 (i.e. PTD methodology, fallow productivity improvement technologies and decision support tools) were each targeted at specific end users. Checklists of questions were developed for each output type and employed to solicit information from the target users (Appendix 2). For the PTD methodology and decision support tools researchers from the Forestry Research Institute of Ghana (FORIG), Soil Research Institute (SRI), Crops Research Institute (CRI), Savannah Agricultural Research Institute (SARI), College of Agriculture and Renewable Natural Resources of KNUST, Ghana Organic Agricultural Network (GOAN) and agricultural extension agents from the MoFA who had been exposed to these outputs were interviewed individually. Others contacted were in the Sustainable Tree Crop Program (STCP) centre in Accra. Those in Ghana were visited in their offices and homes for the interviews if available and by e-mail if absent at the time of visit. Attempts were made to reach other respondents in other parts of Africa, Asia and Europe by e-mail particularly for the decision support tools; however, this was often not possible due to unavailability of their e-mail addresses. Smallholder farmers were interviewed in groups or individually as appropriate at the time of visit for the fallow productivity improvement technologies. The output validation exercise was led by FORIG, the main R7446 project collaborator in Ghana in collaboration with the University of Wales, Bangor.

11. Where and when have the outputs been validated (300 words)

The places and countries, target groups, systems of interest and periods the outputs were validated is summarized in the table that follows.

Output	Places validated	Country	Target group	Production system	Farming system	Period
PTD Methodology	FORIG-Kumasi MoFA-Tano	Ghana	Research Extension	Forest-Agriculture	Smallholder rainfed humid	September 2006
Fallow technologies -*Cocoa agro-forest* -*Maize-cover crop relay* -*Plantain-legume* -*Gliricidia fallow*	Gogoikrom- Atwima Subriso III-Tano Yabrso-Wenchi	Ghana	Smallholder farmers	Forest-Agriculture	Smallholder rainfed humid	September-October 2006

Decision support tools -*LEGINC* -*LEXSYS*	FORIG -Kumasi CRI-Kumasi SRI-Kumasi SARI-Tamale KNUST-Kumasi MoFA-Tano & Sunyani Goan-Kumasi STCP-Accra	Ghana	Research ‘’ ‘’ ‘’ ‘’ Extension & Development officers NGO Research	Forest-Agriculture	Smallholder rainfed humid	October 2006

The outputs were validated September - October 2006 mainly with target users from the CSIR-Ghana research institutes, the University in Kumasi and other research institutes IWMI ad IITA-STCP centre in Accra. An NGO in Kumasi as well as smallholder farmers in three farming communities in Gogoikrom, Subriso III and Yabraso in the Atwima (Ashanti Region), Tano and Wenchi (Brong Ahafo Region) Districts of Ghana respectively were also interacted with to validate the outputs. A total of 30 respondents were contacted comprising 19 farmers, 7 researchers, 3 MoFA staff and 1 NGO i.e. GOAN in Ghana.

Current Situation

C. Current situation

12. How output being currently used and who is currently using output (250 words)

Output	How being used currently	Who is using
PTD Methodology	On farm experiments of mixed tree species farm plantations with fringe communities of the Bobiri Forest Reserve, etc. Promotion of maize-cover crop and plantain-legume technologies from R7446 for adoption in Tano District	Research-FORIG FORIG-MoFA (Extension)
Fallow technologies -*Cocoa agro-forest* -*Maize-cover crop* -*Plantain-legume* -*Gliricidia fallow*	 Cocoa production Improving soil fertility to support maize production Improving soil fertility to support plantain production and stake for trailing yam Improving soil fertility to support maize production and stake for trailing yam	 Farmers ‘’ ‘’ ‘’

Decision support tools *-LEGINC* *-LEXSYS*	Cover crop research Teaching and research Soils research Extension Research Selection of agroforestry and fodder species Research	CRI KNUST SRI GTZ CIRAD UTA (Venezuela) IRE (Mali)

FORIG previously lacked the expertise in collaborative/participatory research. FORIG's participation in the process of developing the PTD methodology from R7446 has enabled the application of the concept in some on farm research projects including ITTO Mixed Tree Species and Integrated Mahogany Plantations. The methodology has also been used in collaboration with MoFA-Tano District to promote short fallow productivity improvement technologies developed from the R7446.

Farmers are utilizing the fallow technologies maize-cover crop, plantain–legume and Gliricida fallow mainly for soil fertility improvement in maize and plantain production systems. Stake for trailing yams is a by product from the Gliricidia in the plantain and planted fallow. Cocoa on the successful plots is now fruiting and one farmer reported harvesting about 2 bags of beans last season. Growth in the indigenous shade trees is appreciable with prekese (*Tetrapleura. Tetraptera)* fruiting.
More anecdotal evidence of the use of the decision support tools has been gathered from e-mail requests for copies, download facilities, and technical support (see next section).

13. Where output being currently used (250 words)

Output	Where being used	
	Place	Country
PTD Methodology	Kubease and Kurofufuom –Ejisu Juaben District Ashanti Region Subriso III, Asuboe, Mpunpunase and Tehnimantia-Tano District, Brong Ahafo Region	Ghana
Fallow technologies -Cocoa agro-forest -Maize-legume -Plantain-legume -Planted Gliricidia fallow	 Gogoikrom-Atwima Subriso III, Asuboe, Mpunpunase and Tehnimantia-Tano Subriso III, Asuboe and Techimantia-Tano Yabraso-Wenchi	 Ghana ‘’
Decision support tools -LEGINC & LEXSYS	 *Widespread	 International

All the R7446 outputs are currently being used in Ghana. Utilization outside Ghana has been difficult to assess in the limited time available. The PTD methodology is being applied for on farm experimentation in two communities in Ejisu Juaben-Ashanti Region and for the R7446 output promotion in the Tano-Brong Ahafo. The cocoa agroforest has been planted on farm fields in Gogoikrom-Ashanti, while the maize and plantain technologies are found in four communities in Tano-Brong Ahafo. The planted Gliricidia tree fallow is on farm fields at Yabraso-Wenchi, Brong Ahafo.

*Actual dissemination of the decision support tools has not been tracked. They are available to download via a number of websites; e.g. IITA, FAO (Technology for Agriculture (TECA); African Conservation Tillage Network; GTZ but there is currently no mechanism to track this usage. We are aware of specific usage, including the selection of cover crops for orchards in the West Indies (CIRAD); selection of agroforestry species and fodder in Venezuela (University of Tropical Agriculture); the Institute of Rural Economy (Mali), but there is a need to track use and any problems encountered which may be creating a barrier to further adoption.

14. Scale of use, time it took to establish use, is use still spreading? (250 words)

Output	Scale of current use	How quickly use established	Is usage still spreading?
PTD Methodology	Low	2 years	Uncertain
Fallow technologies -Cocoa agro-forest -Maize-legume -Plantain-legume -Gliricidia fallow	 Uncertain Medium Low Low	 3 years 2 years 2 years Uncertain	 Yes (some aspects) Yes (some aspects) Yes (some aspects) Uncertain
Decision support tools -LEGINC -LEXSYS	Uncertain	1-2 years	Yes

The PTD methodology is currently being used on a low scale. Over the last two years, the PTD process has been used by FORIG and MoFA Tano. FORIG has been unable to sufficiently promote its use.

With respect to the fallow technologies, farmers planting the cocoa-agro-forest are uncertain of the scale of use of the technology. Many of their plots are in place. Some aspects of the technology such as raising cocoa seedlings in nurseries for transplanting, row planting, paring plantain and regular spacing of the cocoa are being practised over the last 3 years as these facilitate crop growth, branching and pod development in cocoa and ease labour when weeding. The maize-cover crop is being planted on a medium scale over the last two years with some aspects of the technology as the row planting and improved maize variety being widely practiced. The plantain-legume has seen low use although paring and row planting of plantain is being practised by some people. A farmer provided Gliricidia cuttings and knowledge on spacing and row planting on the plantain technology to 3 colleagues in Subriso III on request. Farmers are uncertain of the level of use and spread of the Gliricidia fallows. Although not common, they observed that the stakes used for trailing yam have sprouted on fields of other colleagues who requested some for use.

About 100 copies of the decision support tools were distributed to relevant end users in Ghana, other African countries, Asia and Europe at the end of R7446 (Annex D R7446 FTR, 2003). They were also widely distributed by GTZ/MOFA using the MOFA Directorate for Agricultural Extension Services. C.Ds were distributed to 3 National MOFA Directorates

(Crops, Animal Production, Extension), 10 Regional MoFA offices in the country and 110 District Offices. Further copies were also sent to the 4 Universities, 5 National Research Institutes involved in Agriculture, and 20 NGOs and projects involved in soil fertility measures. Since completion of the project, a further c. 40 c.d.'s have been obtained from UWB; it is not known how many downloads there have been via collaborators' web sites.

15. In your own experience what factors have contributed to or assisted the success of the promotion of adoption of the outputs? (350 words)

Factors could be: programmes, platforms, policy, and institutional structures
In terms of capacity strengthening what is the key fact of success

Although the PTD methodology from R7446 is not currently been used extensively at FORIG and other places, the institute's participation in its development has strengthened its human resource capacity to enable application of the concept in projects. Increasingly, donors including the International Tropical Timber Organization (ITTO), one of FORIG's major external donors, are emphasizing community participation in research and development in the forestry sector. Consequently, some projects being submitted by FORIG to ITTO and others such as the Africa Forestry Research Network (Afornet) have community participatory components. The application of the PTD process in uptake promotion of some outputs from the R7446 has also provided a strategy for promoting the technologies to local communities for adoption which hitherto had not been the practice at FORIG.

For the fallow productivity improvement technologies, the availability of some institutional funding from Agricultural Services Sector Improvement Program (AgSSIP) facilitated promoting the maize-cover crop relay and plantain-legume technologies in the Tano District.

Current Promotion

D. Current promotion/uptake pathways

*16. **Where** is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion **(max 200 words).***

Output	Place of promotion currently	What type of promotion taking place	Who is promoting	Scale of current promotion
PTD Methodology	Ashanti Ghana	On-farm research	FORIG	Low

Fallow technologies -Maize-cover crop relay -Plantain-legume	Tano district/BA Ghana	Uptake/adoption	FORIG-MoFA	Technologies extended to three more villages in addition to the pilot village from 2004-2005. About 130 farmers adopted, 97% for maize and 30% continuing adoption in the two years
Decision support tools	UWB	Provided on demand	UWB	Low

Currently the PTD methodology is not being actively promoted. However, FORIG staff who participated in its development in R7446 are applying the PTD concept in projects with the potential application in more projects in the future. A seminar/ colloquium was given on the PTD methodology by a project participant at FORIG-CSIR (Obiri, B. D. 2004. Participatory Approach to Technology Development: A Methodology. Colloquium. FORIG-Kumasi). A number of FORIG staff were in attendance. Although researchers were invited from the Kumasi – based other CSIR Institutes and the University, only one person from CRI attended.

Within the context of NRSPs Communication Impact Model (CIM), R7446 had worked through to step E of the A-H Uptake pathway (CIM, slide 7) by the end of February 2003, when the project officially ended. R7446 was constrained time wise to accomplish any scaling-up activities with farmers, although it had originally planned to promote the uptake and dissemination of research outputs. Fortunately after R7446, AgSSIP supported the promotion of the maize-cover crop relay and plantain-legume technologies in Tano from R7446 with limited funding from 2004-2005. The technologies were extended to three more villages (Asuboe, Mpunpunase and Tehnimantia) in addition to the pilot village subriso III. 130 farmers adopted the technologies with 97% for maize and 30% adopting in the two years consecutively.

The decision support tools were innovative pilots that were enthusiastically evaluated and demand has been evident without promotion. Promotion would require explicit consideration of how the tools can be institutionalised and then development and training programmes to implement this. There has been considerable interest expressed in LEXSYS and in development of customised tools like LEGINC. The tools formed a central a role in a training programme for agricultural researchers in Southeast Asia and formed part of the development of a suite of decision support tools for vegetable fertilisation in Vietnam and China in the EU RUBRIFARM project.

17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. ***(max 200 words)****.*

Output	*Current barriers to promotion/adoption*
PTD Methodology	No funds for promotion of the methodology to increase popularity and informed knowledge among potential users, i.e. researchers, extension and NGOs

Fallow Technologies -Cocoa agro-forest -Maize-cover crop relay -Plantain-legume -Gliricidia fallow	Insufficient funds for uptake promotion Land tenure Irregular rainfall pattern Limited exposure of the output to extension and NGOs Limited access to planting materials including improved cocoa pods, fast growing legume and indigenous tree seedlings Insufficient knowledge on tree seedling production Insufficient knowledge on tree management
Decision support tools	While LEXSYS operates as a stand alone tool, LEGINC was an innovative pilot but realising the scope for developing such tools requires funds. We have found that for decision support tools to be used effectively there is a need for a critical mass of users and they are most sustainable when institutionalised - implementing these requirements involved investment in identification of roles for the tools and training on their use for extension workers, researchers in both the government and NGO sectors. Databases need updating. Some information is only provided qualitatively but could be readily quantified by legume researchers

According to researchers in FORIG, although the PTD methodology was presented in a colloquium this does not provide adequate information to guide its use by others. Lack of funds to develop a manual and implement training workshops on the use of the methodology for distribution to relevant users has been the major barrier to its widespread use.

Insufficient funds to promote the technologies after the R7446 has been a major barrier to wide spread use of the technologies either directly to farmers or indirectly through development of flyers for distribution to extension workers, NGO's and farmers. For the maize and plantain technologies promoted under AgSSIP, tenure insecurity and irregularities in rainfall distribution constrained adoption. For instance some landless share croppers could not continue adoption in the second year because their tenancies were terminated after the first year and poor rainfall distribution retarded biomass development and pod formation in cover legumes, discouraging some farmers from continuing. Farmers are willing to expand their cocoa fields. However, they are constrained by unavailable hybrid cocoa pods and lack of technical support with respect to advice on indigenous trees especially seeds collection/availability and processing for nursery production as the project previously provided materials.

In Ghana, a number of reasons were given for the constrained use of the decision support tools including limited training/ exposure to the use of the software, inability to access the information on the CD, unavailability of computers particularly for MoFA staff and for some the posted CD's were not delivered. However, it was noted that computer literacy is improving especially amongst the younger generation of researchers and extensionists; and the electronic databases represent an interesting alternative means of accessing information. They are easy to update and dissemination is rapid and cheap. Diffusion of the technology is uncertain given the lack of tracking of downloads from a variety of international websites. The tools are innovative and sophisticated tools that require institutionalisation and training in their use. It is

important that users understand and adopt participatory concepts within which tools are embedded.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues ***(max 200 words)***

Output	Current barriers alleviation measures
PTD Methodology	Production of manual/leaflets on PTD methodology for extension, NGOs and researchers
Fallow-technologies	Training workshops of extension staff & NGOs Production of manual/leaflets on technologies for extension, NGOs and farmers in local languages Land tenure - educating and encouraging land owners for flexible tenancies Increased promotional activities
Decision support tools	The tools are designed as part of an integrated participatory approach and need an appropriate enabling environment - sustainable use requires training of a critical mass of people and their institutionalisation within organisations (government and NGO) involved in research and extension. Analysis of the place of tools within existing organisations and ways of working coupled with training workshops on the application of the decision support tools for Research and Extension are required to enable sustainable use Incorporation of computer literacy into MoFA programmes for extension workers assists continued adoption and adaptation of tools Updating and revision of the databases

Some feasible measures that can be embarked upon to alleviate the major barriers to wide spread use of the outputs will include production of manual/leaflets on PTD methodology for extension, NGOs and researchers. Similarly, flyers on the fallow technologies in local languages will be useful for extension and NGO's. Some training on the technologies for extension and NGO's will also be necessary.

Legume based research is being conducted in many institutions in Ghana. The installation of the decision support tools on ICT network facilities in institutions listed above will improve access to the information developed. It may also be possible to incorporate the information on the Ghana Agricultural Information Network (GAIN) network which will further improve access on the worldwide web.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? ***(max 300 words).***

Output	Best ways to get output used by more people

PTD Methodology	Development of leaflet/manuals for Research, Extension and NGO
Fallow technologies	Development of extension sheets on technologies Incorporation of technologies in existing extension ad NGO programs, Uptake promotion programmes Development of incentives/innovative strategies to entice Landowners to adopt
Decision support tools	Training workshops and manuals on the application of the decision support tools for Research, Extension and NGOs Incorporation of computer literacy into MoFA programmes for extension workers

More generally, the project outputs suggest that offering a range of technologies is necessary to develop a 'culture of enquiry' with technologies being adapted according to livelihood strategies, gender and specific social, political and organisational conditions.

Impacts On Poverty

E. Impact on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

No post project impact studies on poverty in relation to the cluster of outputs have yet been conducted anywhere. However, a preliminary cost benefit analysis of the fallow technologies has been conducted in Ghana (Annex C: McDonald, *et al*. 2003). Cost Benefit Ratios, Net Present Values, Internal Rates of Return and Return to Labour were estimated. Also, farmer perceptions of the benefits realized from the technologies as indicators for poverty alleviation were assessed during the validation exercise in Atwima, Tano and Wenchi.

Study list
McDonald, M.A., Obiri, B. D., Jatango, J. A., Anglaaere, L.C.N., Cobbina, J., Moss, C. Nolte, C., Weise, S. F., Gockowski, J., Sinclair, F. L., Bright, G. and Young, E. M. 2003. *Shortened Bush-fallow Rotations for Sustainable Livelihoods in Ghana*. (DFID Project R7446) Final technical report. 25pp + appendices

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

The preliminary cost benefit analysis of the fallow technologies indicated that they were more profitable than the traditional options under farmer conditions. For instance, the IRR for the cocoa, maize, plantain and Gliricidia fallow technologies were comparatively higher than those for their respective traditional systems. Some indications were also made of the

fallow improvement technologies contributing to improving farm income during the validation with farmers. Farmers planting the maize-cover crop appreciated its potential for improving soil characteristics/fertility and yield as well as reducing labour required for land preparation and weeding after the fallow particularly with Mucuna. Improvements in maize yield from about 2 to 5 100kg bags from 2003-2005 was reported for a half an acre (0.2ha) plot. Land preparation labour has reduced by half from 4 to 2 mandays (5 hours = 1 manday) per acre. Similarly, weeding has reduced from thrice to once after planting maize with elimination of noxious weeds such as *Chromolaena Odorata, Panicum maximum, Mimosa sp*. and *Centrosema pubescens* among others. Although unable to estimate the put and output flows from the plantain technology, one farmer commented it was probably the best for the area in terms of it's the output from bunches and suckers harvested and has a potential to relieve poverty. Maize yield also doubled on plots under Gliricidia fallow in Wenchi compared with that of natural fallow. An average of 120 unshelled maize cobs was estimated from 5m x 5m plots of three years (2002-2005) Giricidia fallow compared with about 64 cobs con natural fallow of same duration.

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

NA (see previous section)

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? ***(max 300 words)***

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Direct: The incorporation of biological material into the interventions has increased biodiversity both in terms of biological organisms and more generally by provision of habitat by increasing perennial cover on farmers' land. The species used are already naturalised in the areas where the work is proposed. Work accomplished under the Alternatives to Slash and Burn Programme has identified shaded agroforests as having significant environmental benefits in terms of biodiversity, carbon stocks and watershed function.

Indirect: A reduction in the use of inorganic fertilisers and associated environmental contamination. Not yet observed, but a reduction in the use of FYM and crop residues as fertilisers would lead to their increased availability as an alternative fuel, and result in a decrease in deforestation.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

There have been no observable adverse impacts.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

With successful establishment, up to 70 tons of carbon ha^{-1} can be sequestered over a bush fallow. This significant quantity can directly benefit smallholder farmers by trading in carbon credits. Carbon sequestration will benefit the local and international community indirectly if it promotes a more stable climate. In general, increased on-farm diversity will reduce vulnerability to drought and other environmental shock, including the risk of bushfire if drying trends continue.

Annex

APPENDIX 1 – KEY TO ORGANIZATIONS

ACT	African Conservation Tillage Network
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement.
CRI	Crops Research Institute
CSIR	Council for Scientific and Industrial Research
FAO	Food and Agriculture Organisation of the United Nations
FORIG	Forestry Research Institute of Ghana
GOAN	Ghana Organic Agricultural Network
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IITA	International Institute of Tropical Agriculture
IRE	Institute of Rural Economy
KNUST	Kwame Nkrumah University of Science and Technology
MoFA	Ministry of Food and Agriculture
NGOs	Non Governmental Organizations
SARI	Savannah Agricultural Research Institute
SRI	Soil Research Institute
UTA	University of Tropical Agriculture

APPENDIX 2 – INTERVIEW GUIDE

CHECKLIST OF QUESTIONS

A. PTD PROCESS

Researchers in FORIG

A colloquium was presented in FORIG in 2004 on the topic: Participatory Approach to Technology Development: A

Methodology. Were you at the colloquium?

If yes:

- What is your general impression of the PTD?
- Do you find it relevant to your work?
- Have you ever applied any aspects of the PTD in your work?
- If yes, how have you used it?
- If not applied it in your work why?
- Would like to use it in your work?
- What should be done to enable you use it in your work?

B. Decision support tools (LEGINC and LEXSYS)

Decision support tools LEGINC and LEXSYS were sent to you from University of Wales, Bangor

Have you ever used them?

a. If yes:

1. How often do you use them?.....
2. What do you use them for?.....
3. Do you find them useful?.....
4. What impact have they made on your work?.....
5. What limitations do you encounter in using them?.....
6. What should be done to improve their use?.....
7. Have you transferred knowledge in the use of the decision support tools to other colleagues/ friends? …….
8. Do you have any idea of other people using them?.....
9. If yes how many people?.....
10. Where are they using them?.....
11. What are they using them for?.....

b. If no:

12. Why do you not use them?.....
13. What should be done to enable you use them?.....

C. Farm technologies

1. Which technology did you experiment? ( ) Maize-cover crop ( ) Plantain-legume ( ) Cocoa + trees ( ) Gliricidia fallow
2. Are you still planting this technology? Yes ( ) No ( )
3. If yes, how beneficial has it been? ( ) Improved soil ( ) Improved yield ( ) Improved income ( ) Improved moisture

content of soil ( ), Reduced weed ( ), Reduced labour ( ) Others please state……

4. How much improvement in yield and income have you obtained?.....
5. How much reduction in weeds or labour have you observed?.....
6. What problems have you encountered in planting the technology?.....
7. How do you suggest these problems can be reduced to enable you continue to plant the technology?.....
8. Have you modified the technology in anyway to suit your condition?.....
9. If so what modifications have you made and why?.....
10. Have you transferred knowledge in the planting of this technology to others? Yes ( ) No ( )
11. If yes which aspects……..
12. Are you aware if other people are planting any of the technologies experimented in this or other villages?.....
13. If yes do you have an idea of the number of people doing so?.....
14. Name the other villages where the technology is being planted?.....
15. How did they get to know of the technology?.....
16. Why did they get interested in planting the technology?……
17. If other people are not planting the technologies, why?.....
18. What can be done to encourage others to plant the technologies?.....
19. If no to question 2 why have you stopped planting the technology?.....
20. What can be done to enable you plant it again?.....

D. MoFA: Extension, District and Region

Three set of outputs were developed from the Bush Fallow Project in collaboration with MoFA, i.e.:

a. The farm technologies (maize-cover crop relay, plantain-legume, cocoa agro-forest and Gliricidia improved fallow)
b. The decision support tools on LEGINC and LEXSYS
c. The PTD process
    1. Have you used any of them in your work?
    2. If yes: Which ones……
    3. How have you used it/them?.....
    4. What have you used it/them for?.....
    5. Where have you used it/them?.....
    6. Have their use been helpful?.....
    7. What constraints/problems have you encountered in using them?.....
    ……

8. What should be done to improve their use?.....
   ……..
9. Have you extended knowledge on their use to other people?.....
10. If yes, who?.....
11. How many people?……..……
12. Where are they?…….
13. What are they using them for?…….