

MANAGING BIODIVERSITY IN AGRICULTURAL ECOSYSTEMS

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*MANAGING DIVERSITY IN THE
AGRICULTURAL LANDSCAPE CASE
STUDY - GHANA*

Presented by

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A CHALLENGE

- Diversity is a resource inherent in nature
- It is reflected variously, notably by composition of biophysical environment
- A challenge is to use diversity of natural resources without destroying it.

AGROECOSYSTEMS SYSTEMS DEVELOPED TO MEET THE CHALLENGE

- Human societies developed systems that, simultaneously, to seek to secure food supplies while maintaining natural ecological integrity including natural species diversity
- Foremost among them is small-holder farming systems
- Through them are domesticated and conserved the world's largest pool of plants and animals used to feed humankind
- Biodiverse traditional systems together with their underpinning indigenous knowledge are under threat

PRESENTATION OBJECTIVES

- ↓ Profiles traditional systems of managing diversity of biota in agricultural landscapes, with a focus on sites of conservational work under UNU/PLEC in Ghana
- ↓ Strengths and weaknesses are highlighted, as are the threats
- ↓ Attempts by PLEC to build upon the traditional systems are outlined, all with reference to PLEC sites in Ghana's major agro-ecological zones
- ↓ Policy lessons are drawn

GHANAIAN AGRICULTURAL LANDSCAPE

↖ As in much of rest of W. Africa, Ghana's natural landscape made up of the following ecozones:

- humid forest;
- dry savanna;
- semi humid forest-savanna, which occupy a dissected plateau and its adjoining coastal plain.

GHANAIAN AGRICULTURAL LANDSCAPE

- ↖ Through various processes, foremostly artificial ones, the natural landscape, particularly the biotic component, is in transition into various human managed land use types
- ↖ Land use types dominated by agricultural ones within the forest, savanna and forest-savanna agroecological zones (MAP)

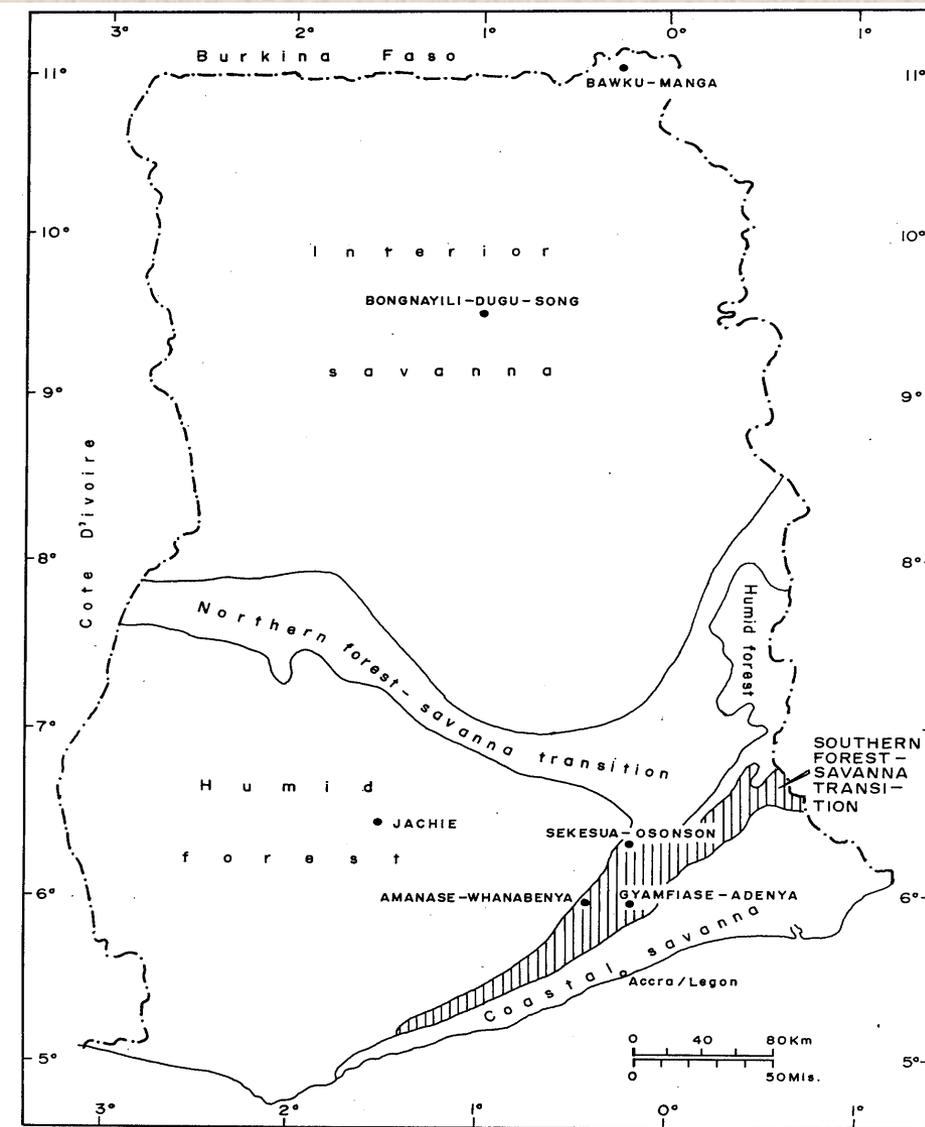


Fig. 1: Major agro-ecological zones and PLEC demonstration sites in Ghana

PROCESSES OF AGRICULTURAL LANDSCAPE CHANGE

↖ FORCES

- Pressures of production associated with increased internal and external population demands:
 - hunting
 - mining
 - farming
 - grazing
- Migration: cross-border movements

EFFECTS

- Deforestation
- Change in natural floral composition
- Change in agrodiversity including positive ones associated with adaptive strategies of farmers

ROLE OF SMALLHOLDER FARMERS

↯ UNU/PLEC seeks to tap the methods developed by smallholder farmers to sustainably manage agrodiversity.

FARMERS PLAYING A LEADING ROLE IN AGRODIVERSITY

- Odorkor Agbo: He exemplifies smallholder farmers who transform the landscape by the way they manage biota within agriculture. He qualifies as an ‘expert farmer’ in PLEC terminology.



**Odorkor Agbo, a PLEC farmer,
demonstrating harvesting of yams in
his farm, a home garden, at Adwensu,
Sekesua-Osonson demonstration site**

This is so because he successfully uses biodiversity involving yams and other assorted food crops, and follows traditional agroforestry management principles to meet the triple challenges of primary production, food security and conservation

•Others: Cecilia Osei; Emmanuel Nartey; Abdulai Sumani; Rosamond Appiah; Amponsah Kissiedu; Gifty Akparibo



CECILIA OSEI (*middle*) together with other farmers and a PLEC scientist (*right*) in a biodiverse farm managed according to *oprowka* system that involves mulching and excludes use of fire: Jackie demonstration site, central Ghana



EMMANUEL NARTEY in his home garden of the agroforestry type at Bormase, Sekesua-Osonson demonstration site, southern Ghana. *(Note the wooden beehive behind him).*



ABDULAI SUMANI, an expert in dry season vegetable farming at Bongnayili-Dugu-Song demonstration site, northern Ghana



ROSAMOND APPIAH, an expert in biodiverse home gardening at Amanase, Amanase-Whanabenya demonstration site, southern Ghana. (*Note the home garden in the background*)



AMPONSAH KISSIEDU demonstrating to school children management of his biodiverse farm founded on a combination of traditional and modern management principles at Adenya, Gyamfiase-Adenya demonstration site, southern Ghana



GIFTY AKPARIBO, an expert farmer in dry season vegetable farming and varieties of rice at the PLEC demonstration site, Nyorigu-Benguri- Gonre, northern Ghana

TRADITIONAL SYSTEMS OF FARMING THAT CONSERVE BIODIVERSITY SUSTAINABILITY

↖ Major ones:

- *AGROFORESTRY*
 - Home garden type
 - Non home garden type, eg. parkland agroforestry and some bush fallow systems
- *NON-AGROFORESTRY HOME GARDENING*
including compound farming

TRADITIONAL SYSTEMS

↖ Preliminary results of analysis of data from field assessment of over 7 categories of land use

stages/types in southern Ghana, shows agroforestry to be among the first two richest in terms of floral diversity. (TRANSPARENCY

4)

↖ Quantitative analysis of variations in the species richness among the land use categories is in progress. Initial results suggest some of the management regimes in TRANSPARENCY 3

to

MANAGEMENT REGIMES

TRANSPARENCY 3

***SLIDES OF TRADITIONAL
AGRICULTURAL SYSTEMS,
MANAGEMENT
REGIMES/PRACTICES AND THEIR
OUTPUTS***



AGRODIVERSITY: a traditional biodiverse agroforestry plot adjacent to the Gyamfiase forest grove, Gyamfiase-Adenya demo. site, southern Ghana



A visiting team of PLEC scientists in a home garden dominated by yams staked live at Adwenso, Sekesua-Osonson demonstration site, southern Ghana



Land in preparation for cropping by using the cleared vegetation for mulching instead of burning it off, in a management system called *oprowka* by Akan-speaking people



Yam, *Dioscorea* sp. being harvested at a PLEC demonstration site in southern Ghana. (Note the roots and small tuber of yam left in place. They will be covered by soil leaf litter to facilitate regeneration of the yam in situ. It is an effective yam conservation practice)



Systematic staking of yams in a demonstration farm owned and managed by Henry Darkey at Bewase, Gyamfiase-Adenya



Rare types of yams on display during an agrodiversity show at Prekumase, Sekesua-Osonson demonstration site, southern Ghana



Products of agrodiversity: varieties of rare crops on display at a show of plants at Prekumase, Sekesua-Osonson demonstration site



Products of agrobiodiversity: demonstrating value of plant-biodiversity by a display of assorted cherished traditional but now rare meals prepared mainly from rare plants. (This was at a show of *TRADITIONAL FOODS BASED ON VANISHING SPECIES*, which was organized by PLEC at Sekesua-Osonson)

THREAT

KEY FACTORS

- Monocropping
- Poverty and limited access to credit
- Lack of awareness of intrinsic and commercial value of agrobiodiversity
- Weak demand for many of the diverse landraces, especially crops of a traditional kind
- Preference for imported exotic foods
- Hasty introduction of exotic modern farm management practices in replacement of the indigenous

↳ *CONSEQUENCE*

- Erosion of natural ecosystems and diversity of endemic species

MEETING THE THREAT

- ↖ Government policy through EAP, MTADP, PGRC and forthcoming Biodiversity Strategy and Action Plan
- ↖ Intervention by NGOs' eg. UNU/PLEC

UNU/PLEC INTERVENTIONS

- ↖ Through participatory approaches, usage of local knowledge, and partnership of scientists, farmers and government agents
- ↖ Activities and related outputs plus policy issues shown by the following slides

WORK ACHIEVEMENTS

ACTIVITY

1. STUDIES OF:
AGRO-
ENVIRONMENTAL
CHANGES AND
FARMERS
REACTION; OF
SMALL-HOLDER
FARMER LAND-USE
PRACTICES; AND
STRATEGIES OF
MEETING
ENVIRONMENTAL
DEGRADATION

OUTPUT

- inventory of plants, including rare ones, notably certain species of yams and trees
(TRANSPARENCY 1)
- deeper knowledge into forces threatening biodiversity
- insights into traditional methods of sustaining biodiversity
- publications, including a book and forthcoming ones

POLICY ISSUE

- How does policy motivate basic research of this kind?
- How may the results be made to feed back into policy more effectively, and be presented to farmers, the end-users in more readily assimilable manner?

2. BIODIVERSITY AND AGRODIVERSITY ASSESSMENT WORK ON SOILS AND BIODIVERSE FARMING

- inventory of plants and their utility
(*TRANSPARENCY 2*)
 - inventory of agro-diversity management practices
(*TRANSPARENCY 3*)
 - wider appreciation of stone lining for minimizing soil erosion on slopes
- To what extent may policy seek to strike balance between ecologically based biodiverse traditional farming and modern monocultures based upon 'green revolution' methods?

2 Cont'd

- wider appreciation of *oprowka/prowka*, a traditional system of soil and biota conservation
 - increased popular awareness of trees that combine (or, conversely, do not combine) effectively with ordinary food crops
 - through quantitative and non-quantitative methods, discovery of following land use types to be exceptionally biodiverse or species-rich:
 - native forest
 - home garden particularly in *huza* areas of migrant Krobo people, who call it *wenyangmo*
- (TRANSPARENCIES 2 & 4)**
- How may results be presented more effectively to farmers and others who manage the biophysical resources?

3. PURELY CONSERVATIONAL WORK

- Conservation of:
 - trees, *in situ*, alongside crops
 - forests adjoining farms and homes
 - disappearing local varieties of rice and the domestic fowl
 - medicinal plants in arboreta
 - assorted plants in school gardens and farms owned on a group basis or on private individual basis by PLEC farmers
 - regenerated forest
- How may these be upscaled through appropriate incentives and policy supported capacity building?
- How may results be presented more effectively to farmers and others who manage the biophysical resources?

4. INCOME-
GENERATING:
ACTIVITIES
AIMED AT
GENERATING
INCOME FROM
BIODIVERSITY,
ADDING MORE
VALUE TO IT, OR
ENHANCING
ECONOMIC
SUSTAINABILITY
OF THE PLEC
PURPOSE

- apiculture/bee keeping in conserved forests, woodlots, farms and fallow areas
- snail farming within and outside forests conserved nearby
- breeding of assorted seedlings on a commercial basis by individual PLEC farmers
- cloth dyeing based on an underutilized plant

- Does this provide an empirical proof of a real link between conservation and development, especially that conservation could be used as an entry point for development from below?

4 Cont'd

- rearing of pigs and goats making use of the large amounts of the hitherto wasted farm residue and hardly used weeds
- spread of the Krobo system of producing yams in biodiverse home gardens, which results in high yields
- processing cassava into flour for bread and pastries
- spinning and weaving of cotton
- processing of sheanut into butter
- processing of oil from groundnut
- production of rafters from woodlots
- If yes, how may it be integrated into policy, e.g. the forthcoming one on biodiversity



Within farm conservation of Cassia siemens for fuel wood by a traditional coppicing method at Bormase, Sekesua-Osonson demonstration site



Forest in regeneration based upon traditional agroforestry principles on land managed by Ex. Police Sgt. Nyame, at Duasin, Gyamfiase-Adenya demonstration site



PLEC scientists in a pose with farmers who conserve rare indigenous varieties of rice at Nyorigu-Benguri-Gonre demonstration site, northern Ghana



Demonstrating conservation by grafting and budding at Bongnayili-Dugu-Song demonstration site in northern Ghana



A traditional system of bee keeping by the earthen pot method in a forest conserved in the backyard



Wooden beehives in the 'PLEC forest', a forest regenerated and conserved by Mr. S. Y. Freeman in his backyard at Whanabenya in Amanase-Whanabenya demonstration site



HONEY: A product of beekeeping in Sekesua-Osonson demonstration site, southern Ghana

CONCLUSION

POLICY LESSONS

- ↖ A realistic policy option is to seek biodiversity conservation as an integral part of systems of land use, above all, agricultural land use
- ↖ Biodiversity stands to be better conserved and the process of development stimulated on a sustainable basis by a policy that:
 - a) seeks to build upon traditional, indigenous or local knowledge and practices;
 - b) places more emphasis upon capacity strengthening through popular sensitization and strengthening;
 - c) stresses incentives through especially farmer-support;
 - d) encourages the PLEC participatory approach and method of working through a partnership of scientists, farmers and policy agents



PLEC scientists, farmers, a Minister of State and other government officials in a pose at a WAPLEC workshop in Ghana



Thank You