

The background of the slide is a photograph of terraced rice fields in Vietnam. The terraces are built on a hillside, with each level being a flat area for planting rice. The fields are filled with green rice plants, and the terraces are separated by low stone or concrete walls. The hills in the background are covered in lush green vegetation, and the sky is a pale, hazy blue. The entire slide is framed by a thick blue border.

Upland Agroecology Research and Development in Vietnam

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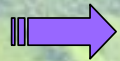
DIVERSE AND COMPLICATED NATURAL AND SOCIAL ECONOMIC CONDITIONS



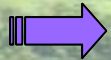
Diversity in:

1. Natural and agroecological conditions
2. Cultures associated with IK
3. Natural resources and biodiversity

Main Development Potential



Rich in human and cultural



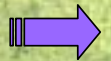
resources and water resources



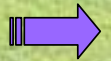
Rich in forest and associated



resources crop geetic resources



Rich in enrgy resources



**Rich in animal husbandry
oprions**

Problems in the highlands

In natural conditions:

- Difficulties in climatic conditions
- Natural resources are being overused
- Severe soil erosion(100 – 200 T/ha of lost soil) and Land degradation (8.5 mil.ha of bare hills/lands in VN)
- Difficulties in water resources management (Drought in dry season, flooding in rainy season)
- Weed infestation
- Frequent natural hazards
- Bad impacts on the sustainability in the lowlands

Problems in the highlands

In agricultural production:

- Low, unstable and decreasing productivity (Maize: 1.5-2.0 T/ha; Upland rice: 0.8-1.5 T/ha; Cassava: 10-14 T/ha).
- Low level post harvest storage and processing development,
- Considerable conflict between crop, animal and forest production (free grazing of animals).

Problems in the highlands

In socio-economic conditions:

- **Remoteness and isolation (limited access to public services and market)**
- **Low education level (low intellectual capacity, affecting planning, management and adoption of advanced technologies)**
- **Low level of infrastructure development**
- **Hunger and poverty are still prevalent.**

Destruction of upper watershed forests



Waste of natural resources



Severe soil erosion



CHALLENGE

Harmonized development of crop production, animal husbandry,
forestry and
Natural resources improvement and environment production



The main GOAL

Hunger eradication
and poverty reduction

towards

Achieving and sustaining economic, political,
social and ecological (environmental)
stability

13 8 2005

CONCRETE GOALS

1. Food security and stability for upland farmers
2. Improved natural resources and environment protection.
3. Social equity (reduced disparity between lowland and upland; rural and urban areas; ethnic groups, etc.).

Activities to achieve goals

1. Food security and stability for upland farmers:

- Varietal improvement and developed seed multiplication,
- Integrated crop management,
- More effective use of water resources,
- Development of commercial production
- Development of intensive animal husbandry
- Conservation agriculture



Activities to achieve goals

2. Improved natural resources and environment protection.

- Research and development of sustainable agricultural technologies for sloping land cultivation (preventing soil erosion and degradation, improving soil infiltration capacity, water holding, soil fertility, etc.).

- Rehabilitation of bare lands/hills (Cover crops, green manure, organic fertilizers, reforestation, etc.).

- Development of highly productive but environment friendly agro-forestry production technologies.

Activities to achieve goals

3. Social equity (reduced disparity between lowland and upland; rural and urban areas; ethnic groups, etc.).

- Development of lowland economy to support upland rural development.
- Capacity building (Physical and mental capacity, manpower and facilities - equipment).
- Infrastructure construction (Road, medicinal stations/hospitals, schools, universities, information/mass media facilities, etc.)
- Other institutional and social changes.

Development of upland agroecology

Main objective:

- Sustainability of upland agriculture (including integration of animal husbandry) and forestry development with special emphasis on soil, water and other resources protection and enrichment.

Main principles

- *Permanent soil cover and minimal soil disturbance,*
- *Direct sowing*
- *Cropping pattern diversification: intercropping, crop rotation, relay cropping, cover crops, animal fodder crops, etc.*

Activities in upland agroecology in recent years

- i. Soil mulching and direct sowing**
- II. Fast soil improvement by soil smouldering**
- III. Making miniterraces combined with soil much and DMC**
- IV. Integration with animal husbandry – fodder grass and cover crops test planting**
- V. Crop species and their varietal improvement**

All have been done in cooperation with CIRAD, IRRI, IRD, ICRAF, etc. since 1999 with the implementation of SAM Project in Bac Kan (North of Vietnam).

- VI. Establishment of NOMARC as a Agroecology research, development and training center for mountainous regions.**
- VII. Establishment of the Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI) in December 2005.**

Main achievements in SCV

- **Average yield increase by 75% from more than 25 sites**
- **Reduction in soil erosion by more than 70%**
- **Increased animal production at less pressure of free grazing**
- **More than 1500 ha under DMC in most of mountainous provinces including central high plateau**
- **More than 2000 farmers involved in DMC**

Reduced women drudgery on weeding



Protect soil resources by soil erosion control



Control of soil erosion and run-off

Famers' practice



Mini-terrace with mulch



Keeping soil moisture accelerating crop growth



Asuring SUSTAINABLE CULTIVATION ON SLOPING LANDS



Soil smouldering: trenches (30x30x30 cm)



Soil smouldering: Fill the trenches with dry vegetal material, then by rice husks, then cover with 10 cm thick layer of soil with chimneys 1 to 1.5 m apart to facilitate the burning



Soil smouldering: Mulch the field and sow rice (or Maize) on the two sides of each trench.



Soil smouldering: Intercropping of legume crops for soil improvement. We can see clear improvement of rice yield (1.9 t/ha against 0.4 t/ha in the control plot).



Soil smouldering: After rice harvest, canavalia continues to grow and creates rich biomass to improve the soil fertility



Integration with animal fodder production



Development of animal production as main source of household cash income



Problems remained

- **Lower germination of crop seeds under mulch**
- **More labor may be required with the lack of mulch materials? (Labor pressure at sowing/planting period?)**
- **Band mulch against full surface mulch?**
- **Applicability of post-germinate mulch?**
- **Disease transmission through mulch?**
- **Allelopathy?**
- **Soil biology research? (Big gap)**
- **Capacity strengthening, etc.**

Demands from VN

- **Continue cooperation with CIRAD research to promote DMC in VN and to answer the above mentioned questions**
- **Continue cooperation with CIRAD in capacity building (Both manpower and equipment) for young NOMARC to become a research, extension and training center in SCV, not only for VN but also for other countries in the region.**
- **Some staff of SAM have been trained directly on-the-job, and now they can work well in the fields of SCV, so VN can be a key country to share experts and experience with Laos, Cambodia, etc.**

Picture illustration

Different mulching modes



Reduction of land preparation drudgery by improvement of soil structure under mulch



Mini-terrace with mulch



Yield increase with soil mulch



How mulch can keep soil from run-off



Living mulch as permanent soil cover



Integration of animal fodders



Thank you for attention