



# ***Diverse production systems:*** **Local management of plant genetic resources**

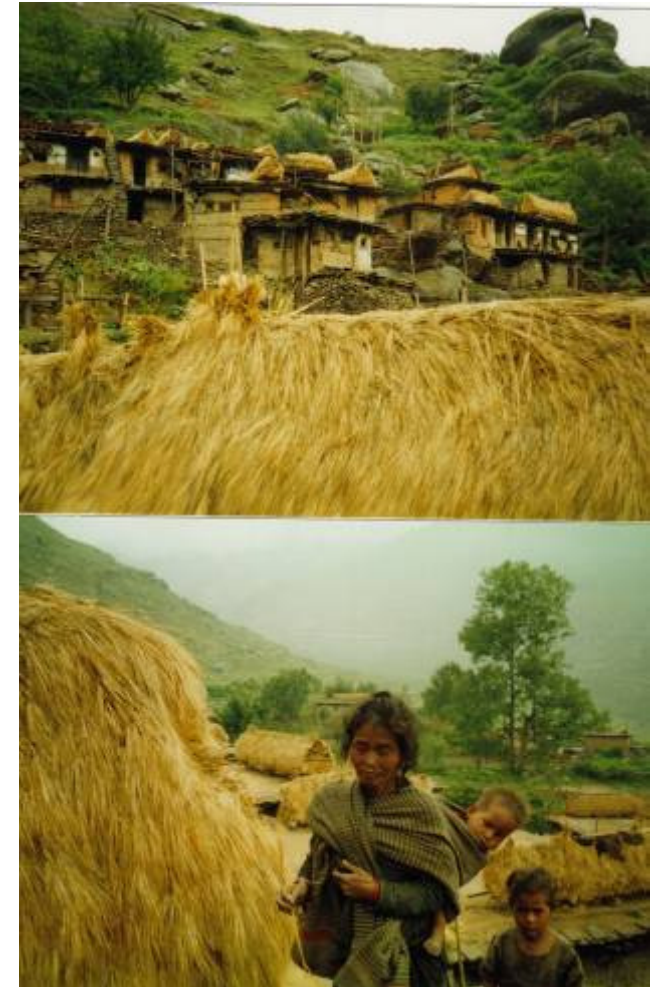
Bhuwon Sthapit  
Bioversity International  
13-14 February 2008  
FAO, Rome

A colorful illustration at the bottom of the slide depicting a woman's face on the left, surrounded by various agricultural products including corn, tomatoes, grapes, and a chicken on the right, set against a background of rolling hills.

*Improving lives through biodiversity research*

## Starting point

- Community concern is with extreme events, their frequencies and predictability!
- Knowledge gap on how these farmers and communities are coping with climate change over the years?
- What are those traditional knowledge and practices that we can build upon?





## Community estimates of diversity for traditional varieties in crops (n=15; 8 countries) Jarvis et al., 2008)

Crops	Average Farm Richness (TV)	Community Richness (TV)	Community Evenness (TV)	Average Divergence (TV)
Rice	2.2	34.8	0.77	0.64
Maize	1.6	8.5	0.60	0.70
Cassava	2.1	60.3	0.96	0.66
Millet	1.4	14.0	0.67	0.76
Weighted average	1.8	14.0	0.70	0.64

# Diversity for adversity

## Portfolio of varieties-69 cultivars

Ekle-stability

Bhatti-wetter years

Anga-drier years

Mansara-marginal

## Portfolio of management practices

Seed priming

Mixed farming

## Portfolio of use practice

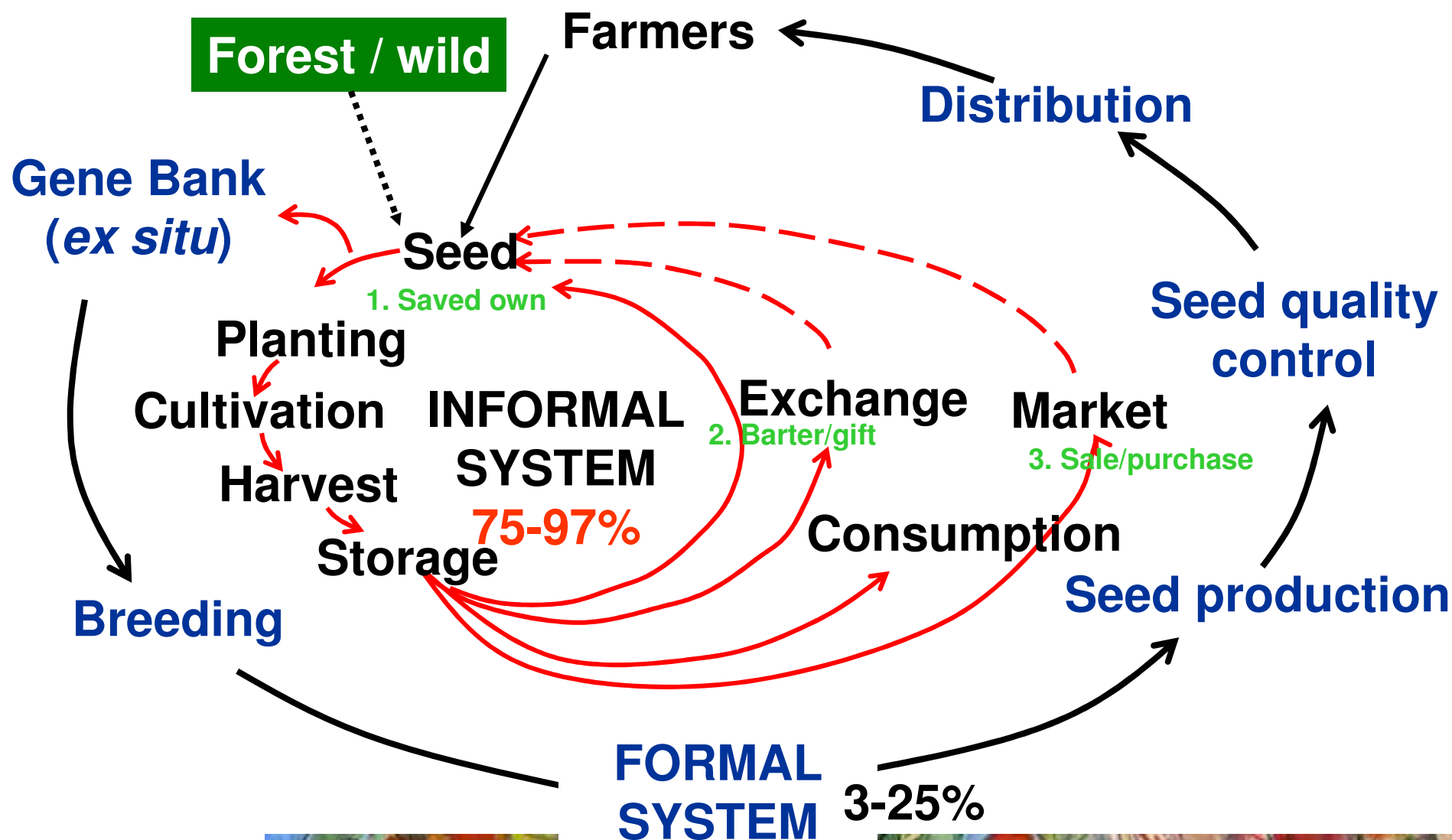
Uncultivated food

Cooking methods





# Traditional system of local innovation and local crop development



# Flow of genetic materials

Means of Flow	Change (%) in Flow of Genetic Materials								
	Begnas (1200m)			K/ Chheu (600m)			Bara (100m)		
	2001	2004	2005	2001	2004	2005	2001	2004	2005
Exchange	53	64	51	58	54	67	64	56	52
Gift	31	30	42	36	38	30	17	5	6
Purchase	16	6	7	6	8	3	19	39	42

**Exchange and gifts are most common social customs**  
**Changes are happening –increase in sale of seed**

## Informal seed system: Access for farmers a secure source of locally adapted seed

Country	Crop	Contribution of farmer seed system (source) %	Reference
Burkina Faso	Sorghum	95	Kabore, 2000
Mexico	Maize	75	Ortega-Packka et al., 2000
Morocco	Durum wheat	87	Mellas, 2000
Nepal	Rice	97	Baniya et al., 2003

In India alone-100 million farms-15-20% of them use seed from the regular seed trade; the remaining 80 m farms depend on self saved seed or seed supply from farmers! (Swaminathan, 1998)

# Farmer seed system functions:

## Germplasm base

- diversity, flexibility, selection

## Seed production and quality

- germination, vigor, disease problems, quantity

## Seed availability and distribution

- seed sources, [social networks](#), markets

## Knowledge and information

- adaptation, growing methods, utilization, knowledge of new materials, traits trade off

(Source: Hodgkin and Jarvis, 2003)



# Social seed networks: Who maintains diversity and how?

Trust  
Reciprocity  
Custom

**What is farmer system?**

- ✓ own saved seed
- ✓ exchange
- ✓ gifts
- ✓ purchase

**Who is nodal farmer?**

- ✓ high frequency of exchange seed and information to other farmers

**Who is innovator?**

- ✓ search
- ✓ select
- ✓ maintain
- ✓ exchange

**Meta-population Theory**

- ✓ migration
- ✓ colonization

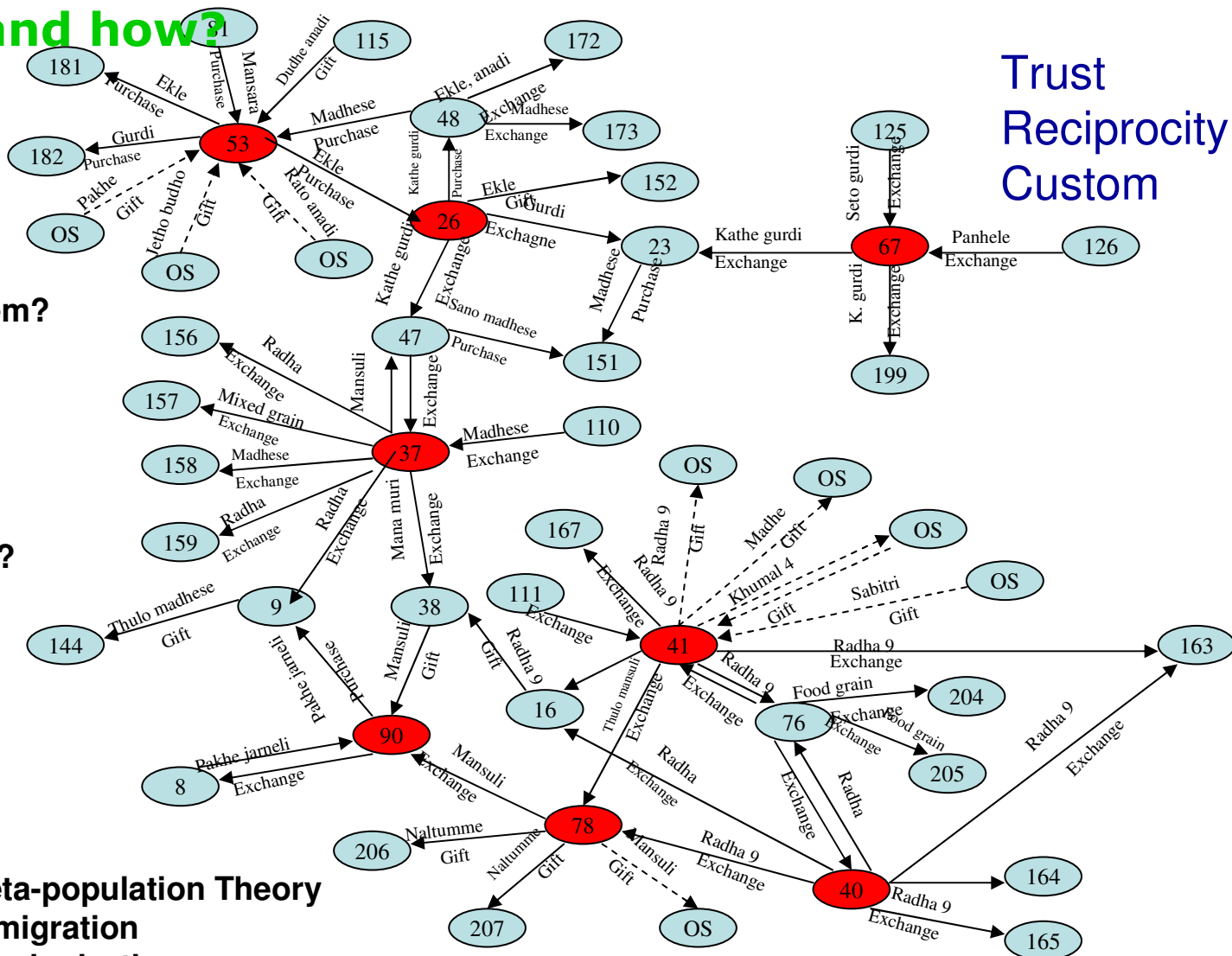
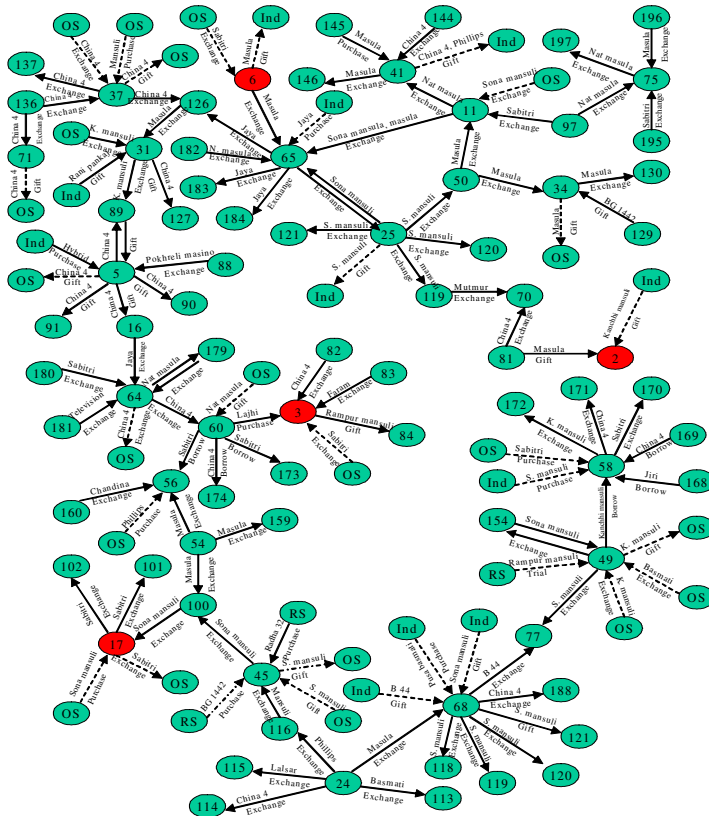


Fig 1. Farmers' network on rice seed flow in Begnas eco-site (Subedi et al 2003)

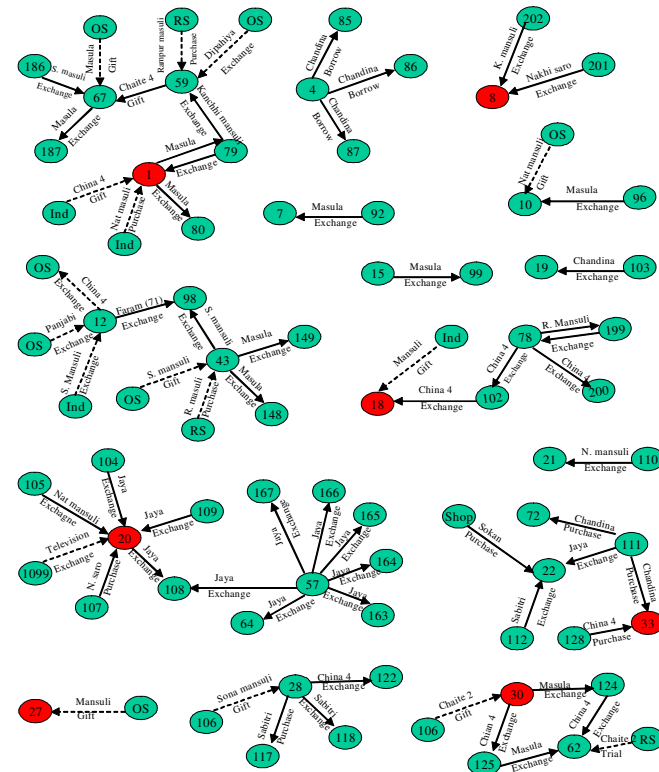


# Social seed network in Bara, Nepal

## Resilient to climate change



Impact on diversity?  
Community interventions?



## Size of networks-strong vs weak; open vs close network (Paudel et al., 2008 in press)



# Impact of poor social networks

Year of study and type	No. of LR/MVs		% of no. of LR growers	% of area occupied by	
	LRs	MVs		LRs	MVs
<b>Baseline 1998</b> (n=202 HHs)	<b>33</b>	<b>20</b>	<b>67.8</b>	<b>16.7</b>	<b>83.3</b>
<b>CBR 2003</b> (n=349 HHs)	<b>14</b>	<b>26</b>	<b>31.8</b>	<b>3.4</b>	<b>96.6</b>

(Source: Shrestha et al., 2006)

# Community actions to improve access of local varieties



## Access to landraces from Community Seed Bank

Year	Number of farmers of different socio-economic				No. of landraces	Seed (Kg)
	Rich	Medium	Poor	Total		
2007	23 (23)	34 (33)	45 (44)	102	28	103
2006	7 (11)	25 (39)	32 (50)	64	21	80
2005	17 (20)	37 (42)	33 (38)	87	23	197
2004	6 (17)	14 (40)	15 (43)	35	13	69
2003	5 (12)	19 (48)	16 (40)	40	11	87

## Local community based interventions

- What are tools and methods that empower communities to assess community diversity and develop both conservation and development actions?
- What are the possible community based interventions that support farmers and communities to cope climate change through use of plant genetic resources?
- Change management to adaptation and mitigation and assessing change



# Community action 1: Seed diversity fair



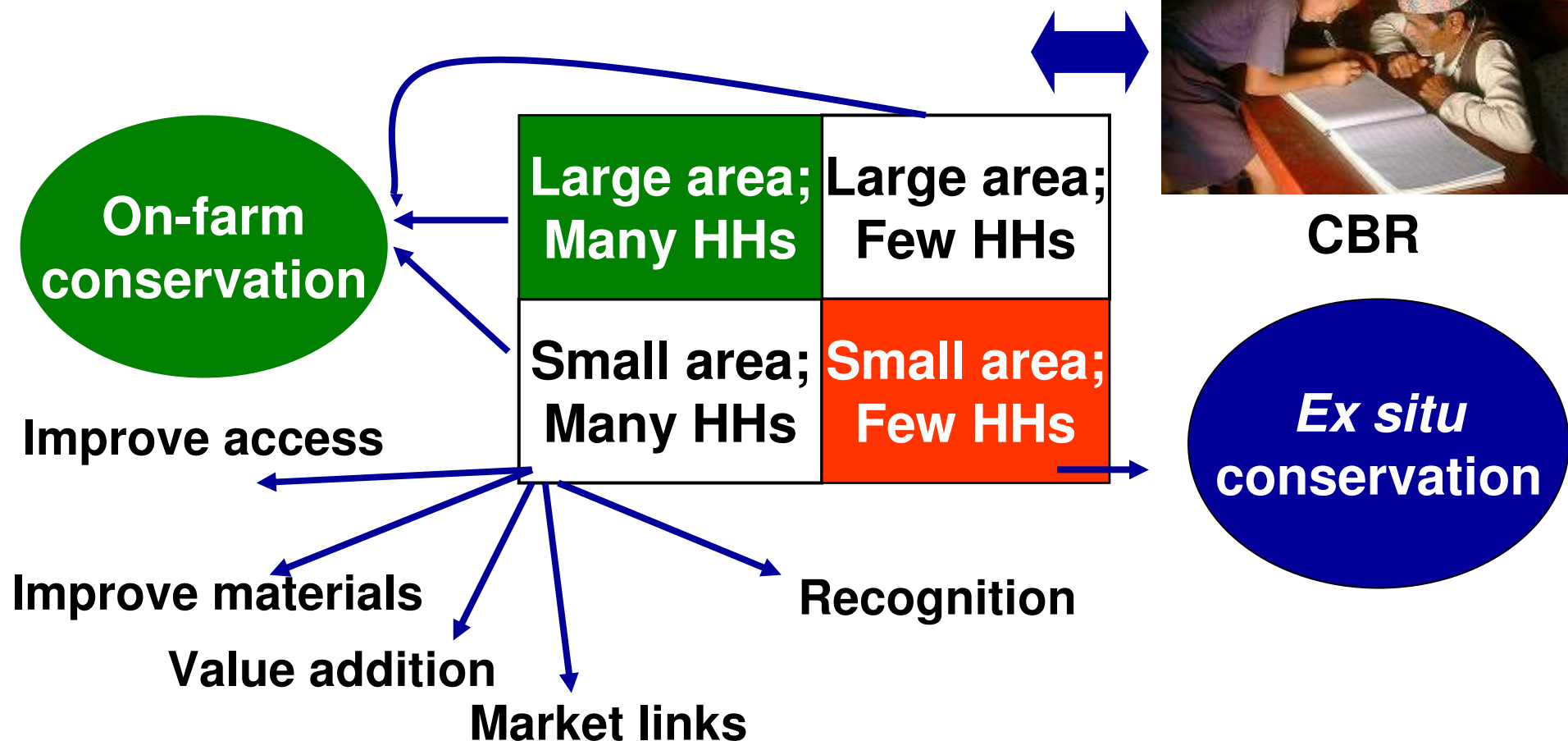


## Community action 2: Participatory learning for understanding local context and associated traditional knowledge



Tools: Four cell analysis, TK Journal, CBR, Participatory diagnostic tool; PRA, Survey etc

# Community action 3: Empowering community for setting development and conservation agenda





## Action 4: Diversity Field For a/ CBM





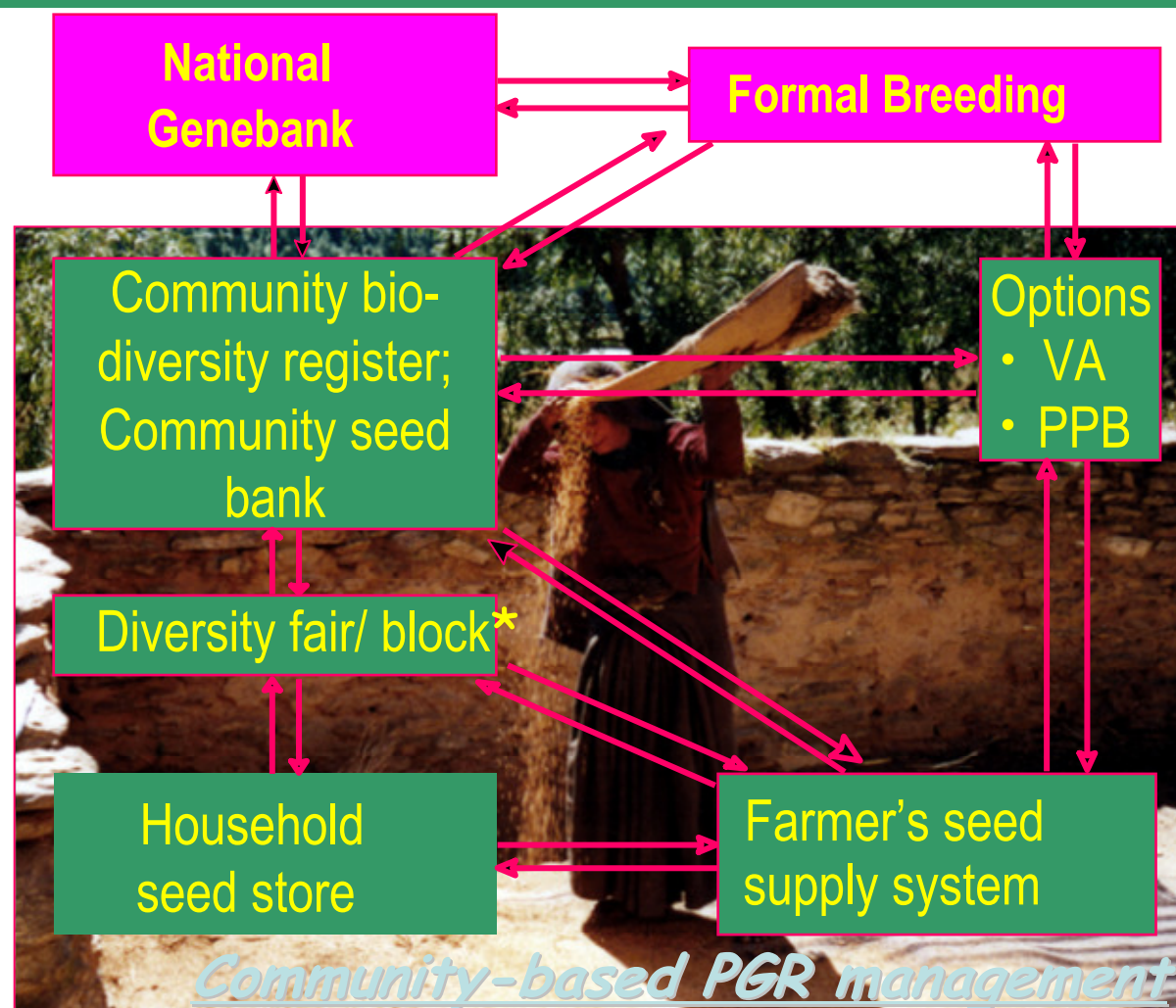


## Community action 5: Community biodiversity register and community seed bank



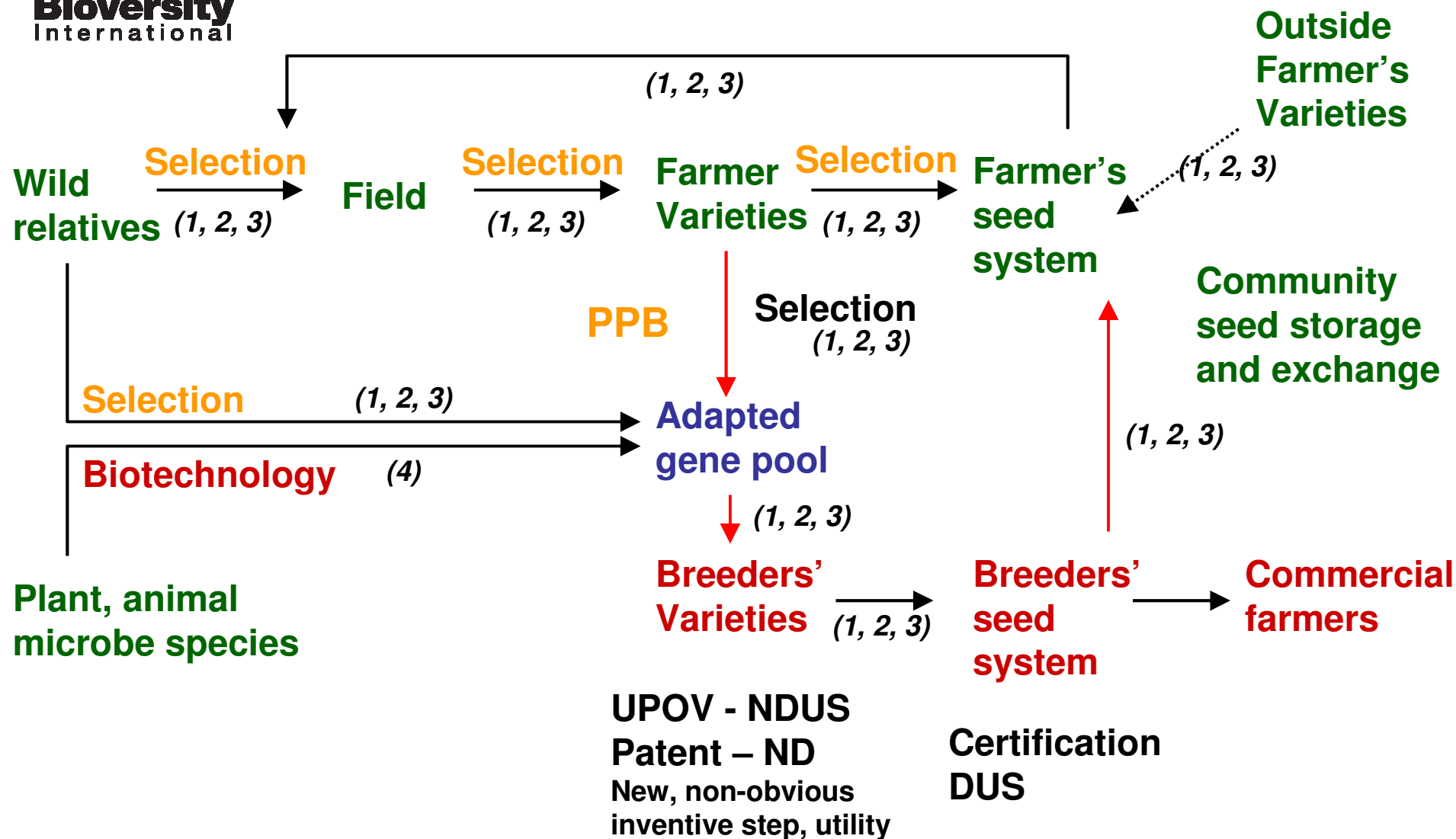


# Strengthening local capacity for management of local crop diversity for rural livelihoods and income



(Source: Sthapit and Jarvis, 1999)

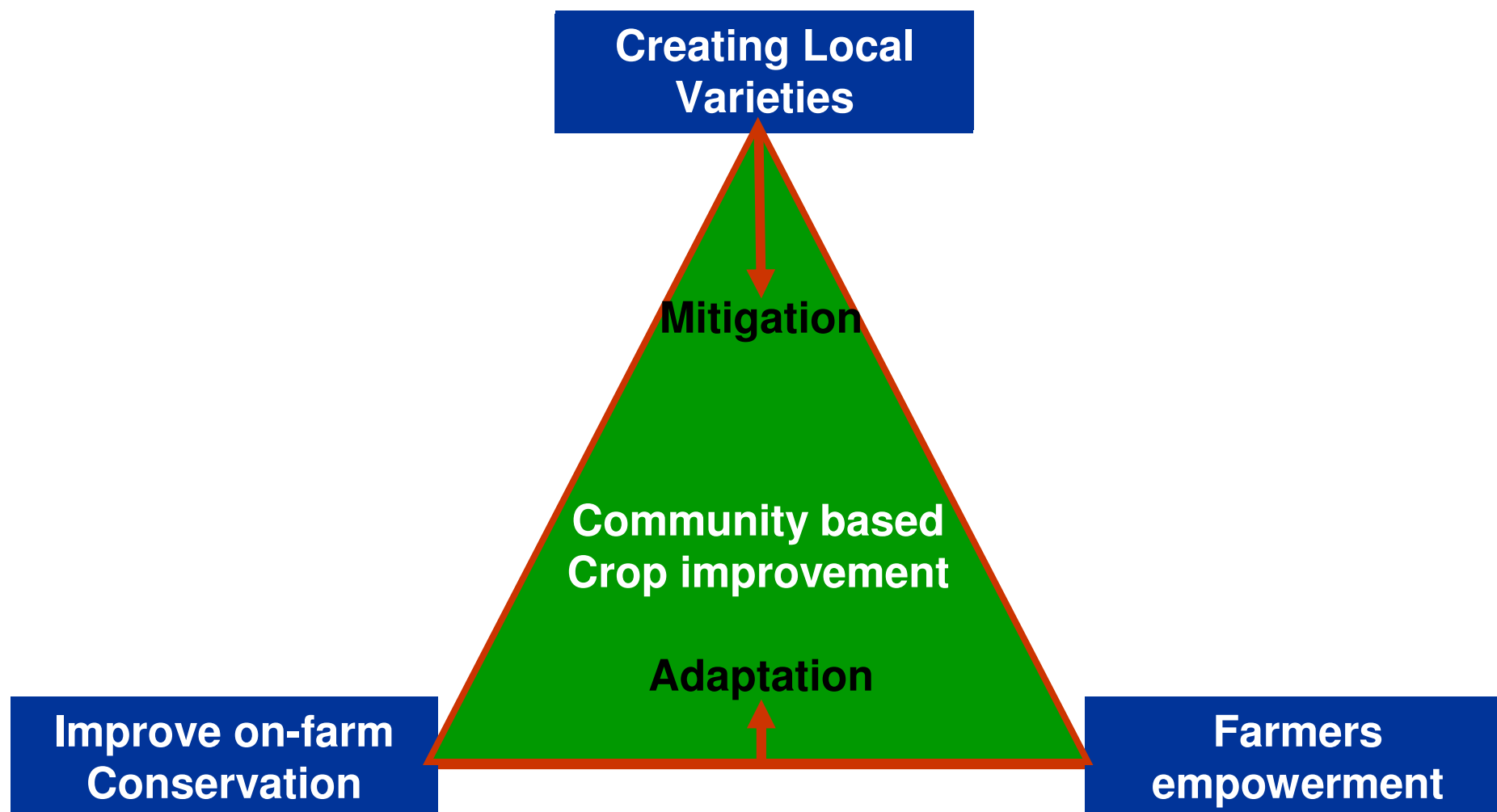
# Consolidating role of farmers as conservers, promoters of diversity and as dynamic Innovators ??



Basic concerns: (1) ACCESS; (2) IPR; (3) MARKET; (4) BIOSAFETY (Sajise et al., 2007)



# Conceptual framework





Reality: There will never be enough plant breeders for all crops for all situations!



*Capsicum microcarpum* L.



*Momordica cochinchinensis* L.



*Sechium edule* L.



*Trewia nudiflora* L.



*Cucurbita moschata* L.



*Coccinea grandis* L.



*Cyphomandra betacea* L.



*Luffa cylindrica* L.



*Colocasia esculenta* L.



*Dioscorea* spp. L.



*Brassica juncea* var. rayo



*Dolichos lablab* L.

**Approach: Teach how to fish rather than providing a fish!**



# Challenges

How can we support the system that empower community to make decision on local management of crop diversity and prepare them for coping vulnerability and opportunity?

How can global forum assist capacity of farmers and local institutions for searching, selecting and exchange plant genetic resources and associated knowledge that benefits poor farmers?


How these local management strategies could be used for global relevance?





A horizontal decorative banner at the top of the slide with a colorful, abstract pattern of various colors including green, yellow, red, and blue.

## Take home messages

- Maintaining healthy seed systems at local level should be a coping strategy for climate change
  - Community-based CBM approach is a holistic way to integrate crops, forestry, fish, and livestock for mitigating negative effects of climate change at local level
  - Need mechanisms for strengthening community capacity to access genetic resources and associated information and skills in breeding at local to global levels
- 
- A horizontal decorative banner at the bottom of the slide with a colorful, abstract pattern of various colors including green, yellow, red, and blue.



*Thank you very much*