GIAHS and farmers innovation

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Table 1—Partial distribution and extent of non-certified organic agriculture in the developing world

Region	Number of farmers	Area (hectares or %)	Contribution to food security
Latin America	a. 160 million peasant units b. 50 million indigenous people	38% of total land devoted to agriculture, about 60.5 million hectares	a. 41% of food crop consumed domestically b. Half of humid tropics in Mexico and Amazon
Brazil	4.8 million family farmers	30% of total agricultural land	50% of land devoted to food crops
Cuba	1612 cooperatives and individual peasants	1.5 million hectares	10% of all food crops
Africa	a. 60-80% labor force involved in agriculture b. 70% of population living in rural areas (about 375 million) of Sub-Saharan Africa	100-150 million hectares	80% of cereals 95% of meat
Asia	200 million small scale rice farmers	a. 7.3 million hectares of upland rice b. 20.5 million hectares of rainfed rice	200 million people supported by upland shifting cultivation
Global estimate for developing world	50-100 million small holder family units	40-90 million hectares	30-50% of basic food crops

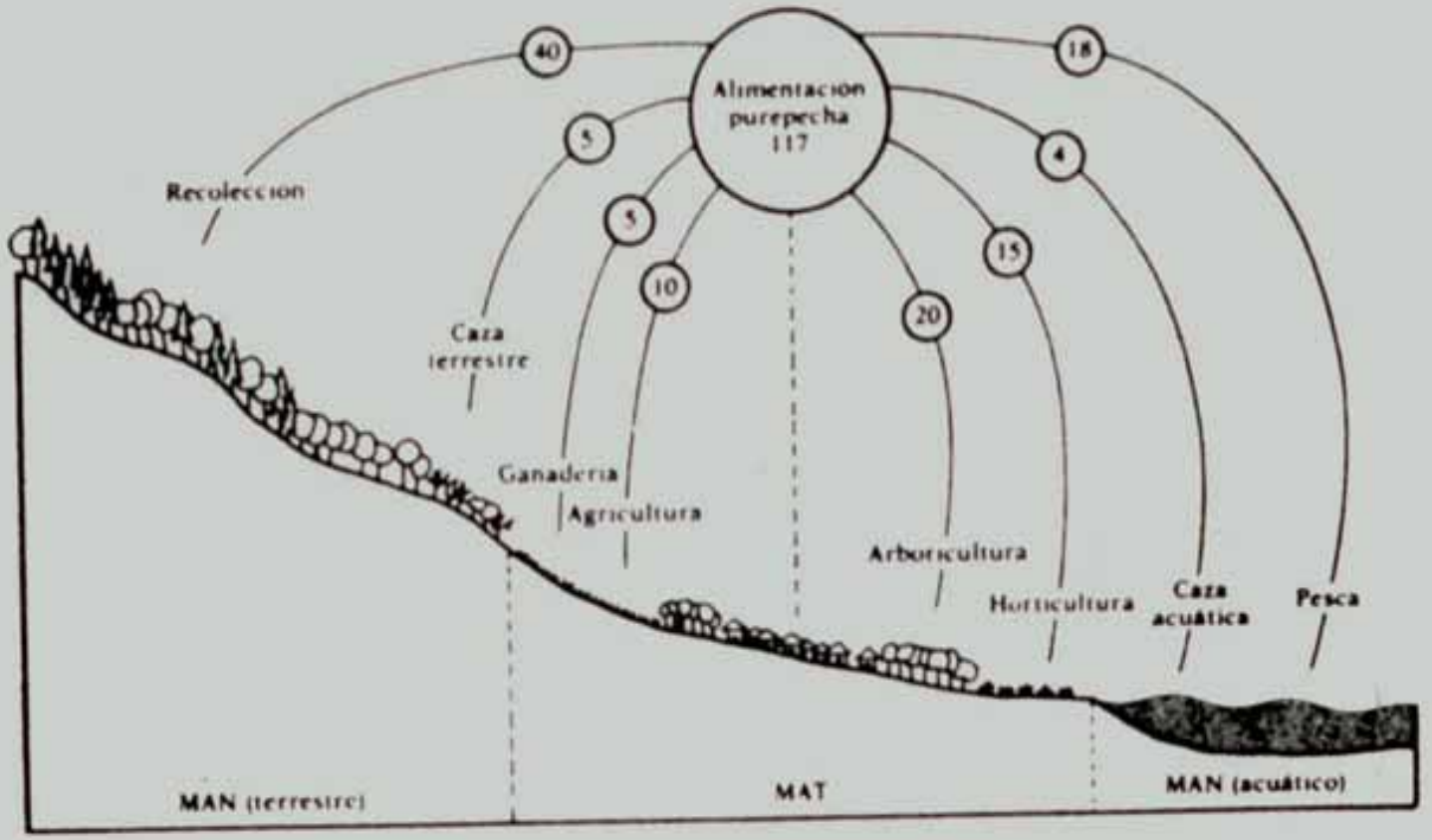
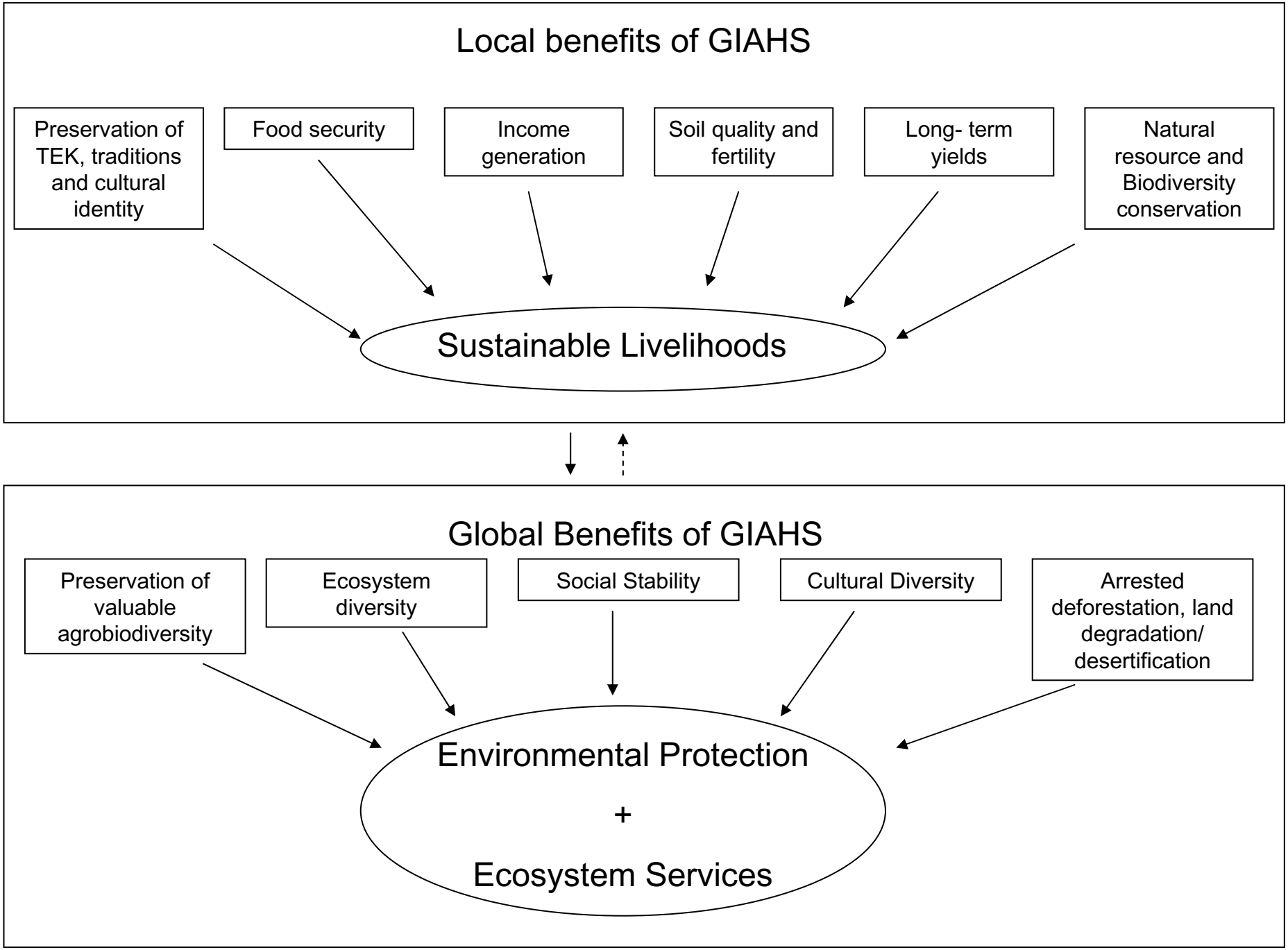


Figura 7. Número de especies alimenticias producidas y consumidas por los purépechas del lago de Pátzcuaro, Michoacán (elaborado a partir de Toledo *et al.*, 1980).


Local benefits of GIAHS
Preservation of TEK, traditions and cultural identity
Food security
Income generation
Soil quality and fertility
Long- term yields
Natural resource and Biodiversity conservation
Sustainable Livelihoods
Global Benefits of GIAHS
Preservation of valuable agrobiodiversity
Ecosystem diversity
Social Stability
Cultural Diversity
Arrested deforestation, land degradation/ desertification
Environmental Protection
+
Ecosystem Services

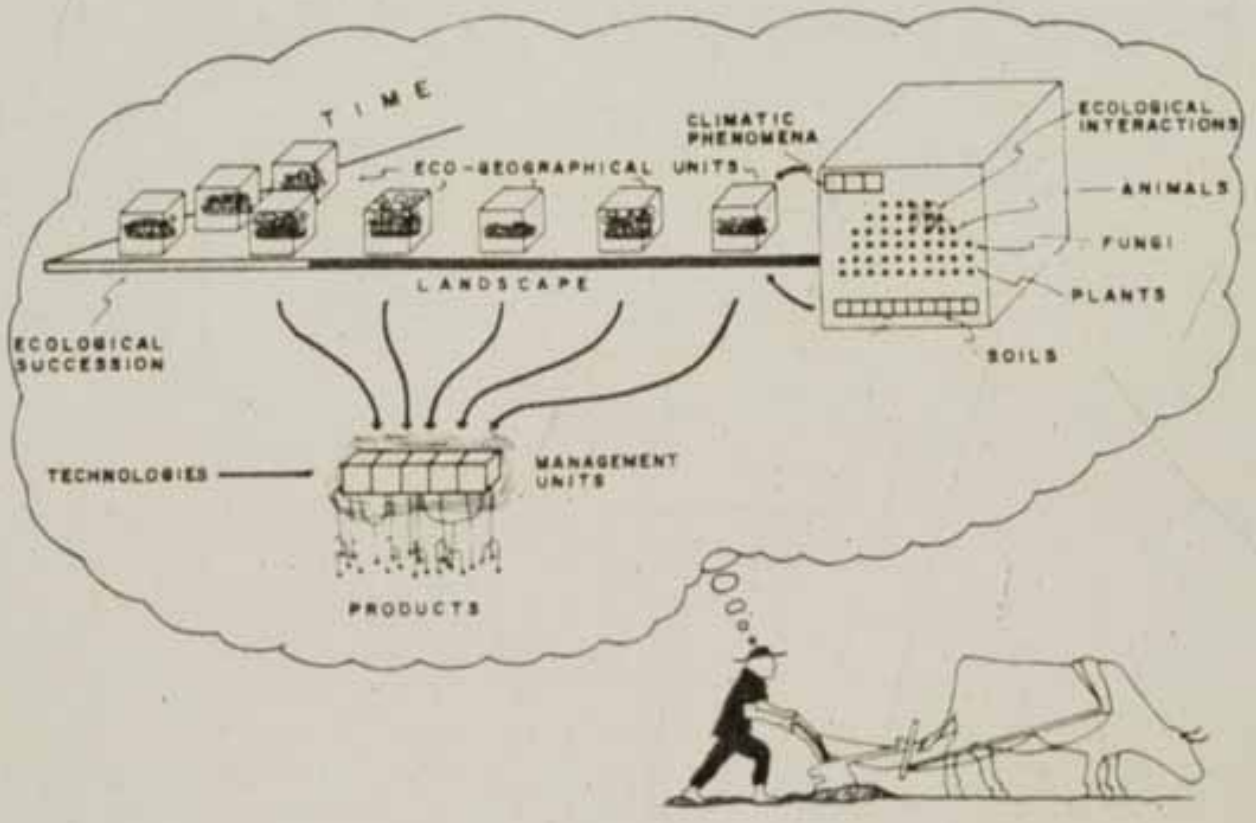
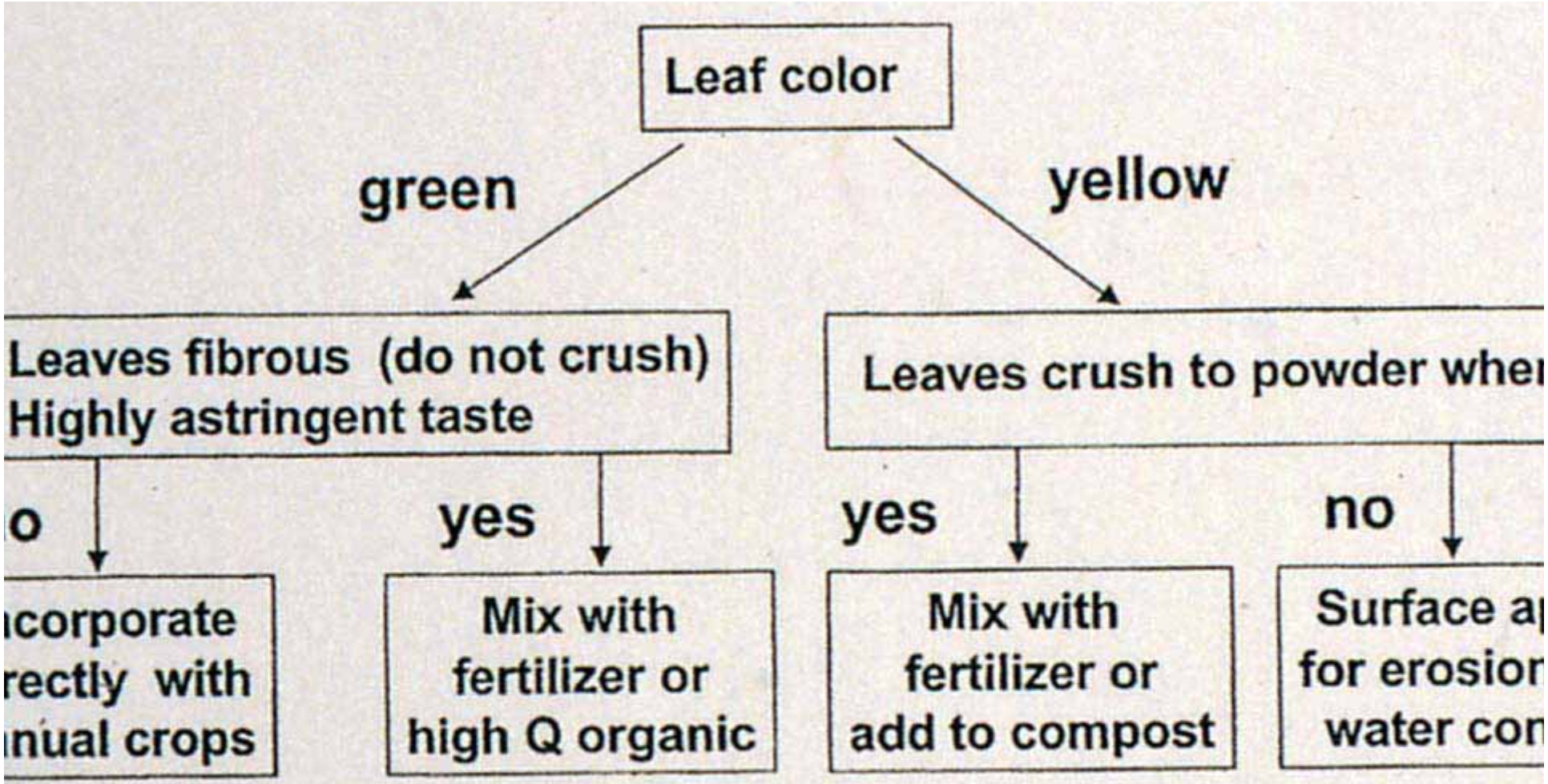


FIGURE 4. An integrative scheme of peasant knowledge of Nature.

Comparison of productivity of native varieties and Borlaug varieties of wheat

	Native variety	Borlaug variety
Yield Kg/ha	3291	4690
Water Demand	12" 5.3 cm	36" 16 cm
Fertilizer Demand	47.3	88.5
Productivity with respect to water use (kg/ha/cm)	620.94	293.1
Productivity with respect to fertilizer use (kg/ha/kg)	69.5	52.99



ure 5. Farmer decision tree for assessing organic matter q
management: Translating application into practice (from
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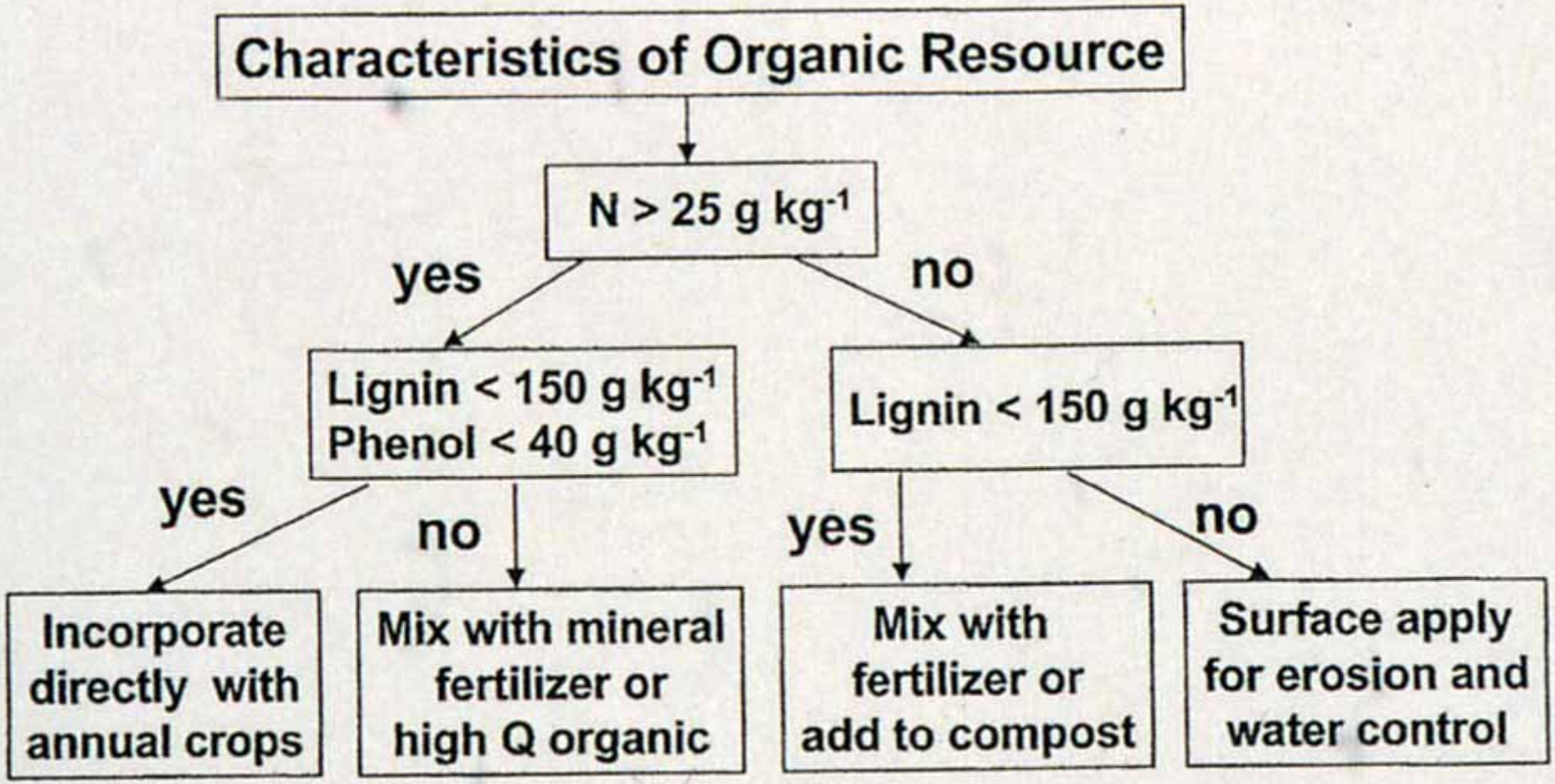
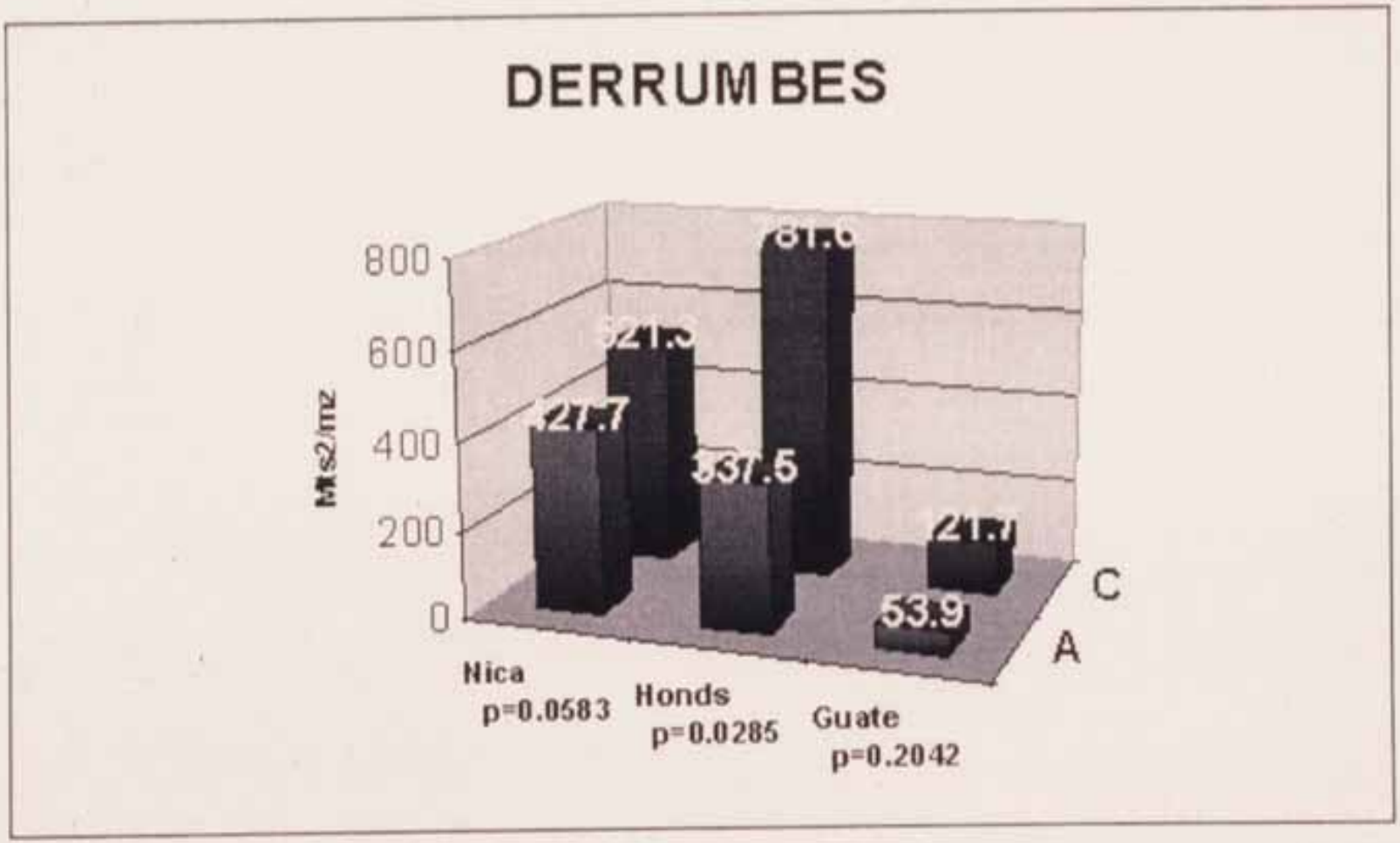


Figure 4. Decision tree for biomass transfer of plant materials for soil fertility management: Translating theory into application (from Palm et al. (1997)).

MUD SLIDES POST MITCH IN CONVENTIONAL (C) AND AGROECOLOGICAL (A) FARMS



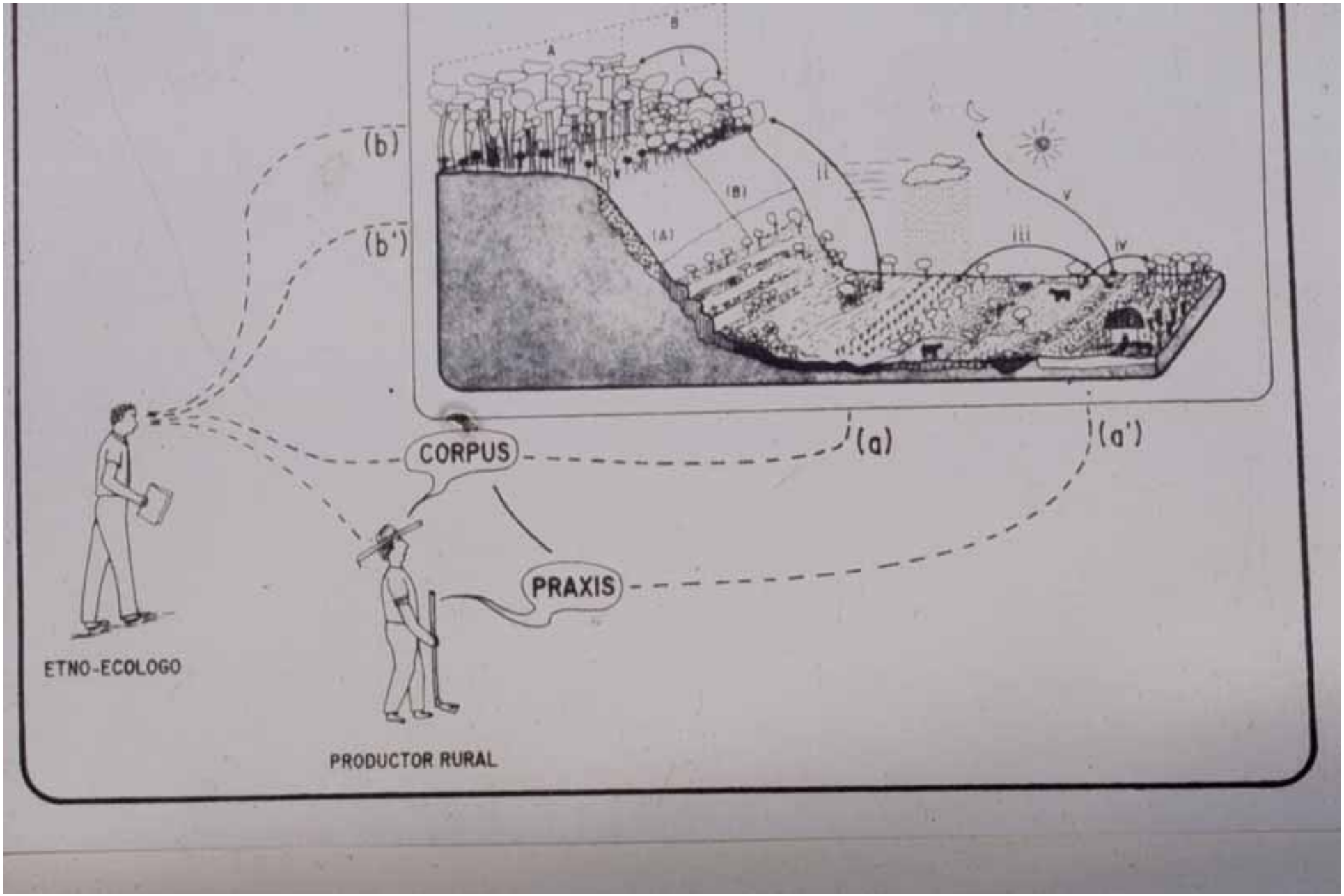
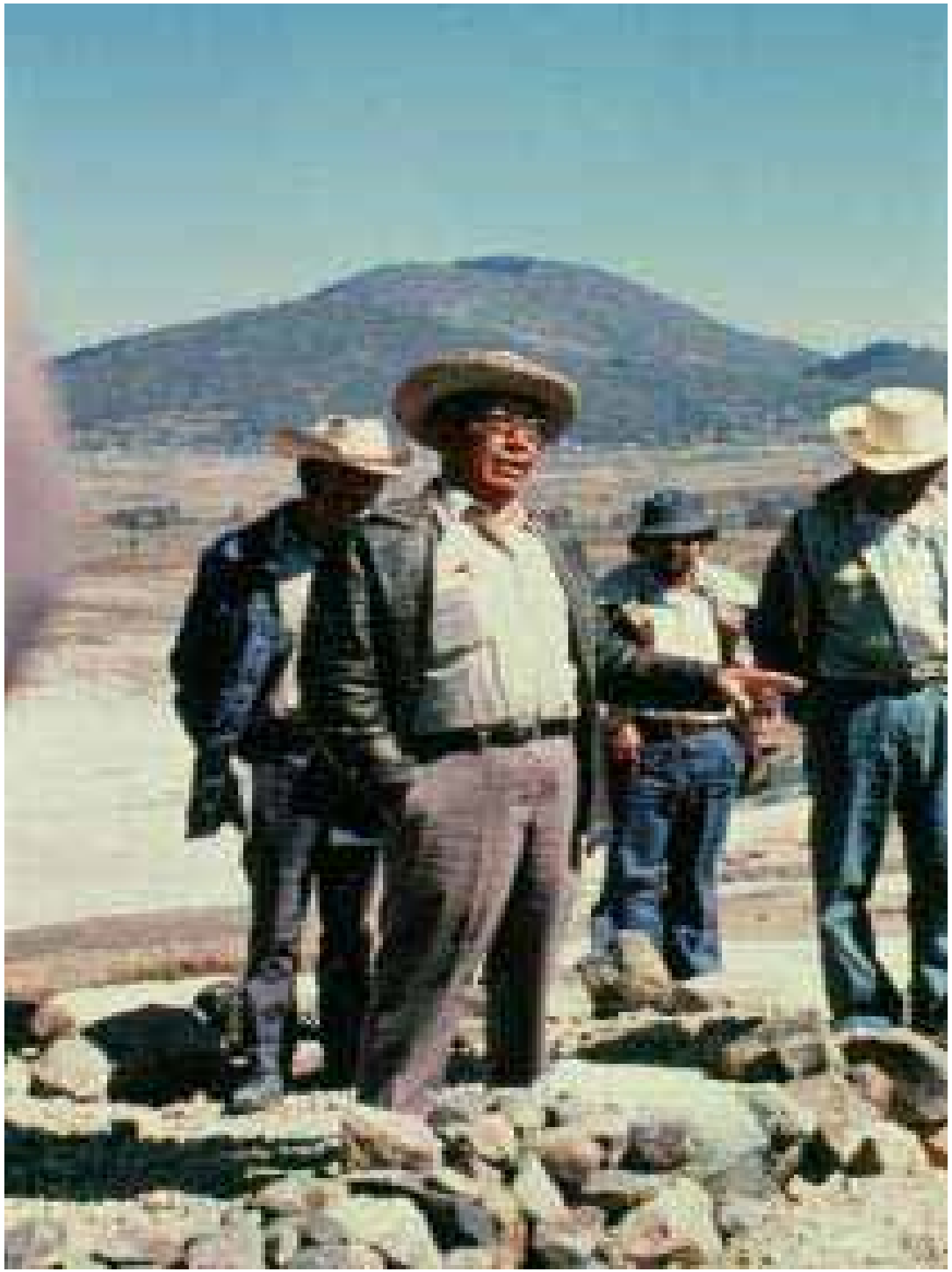
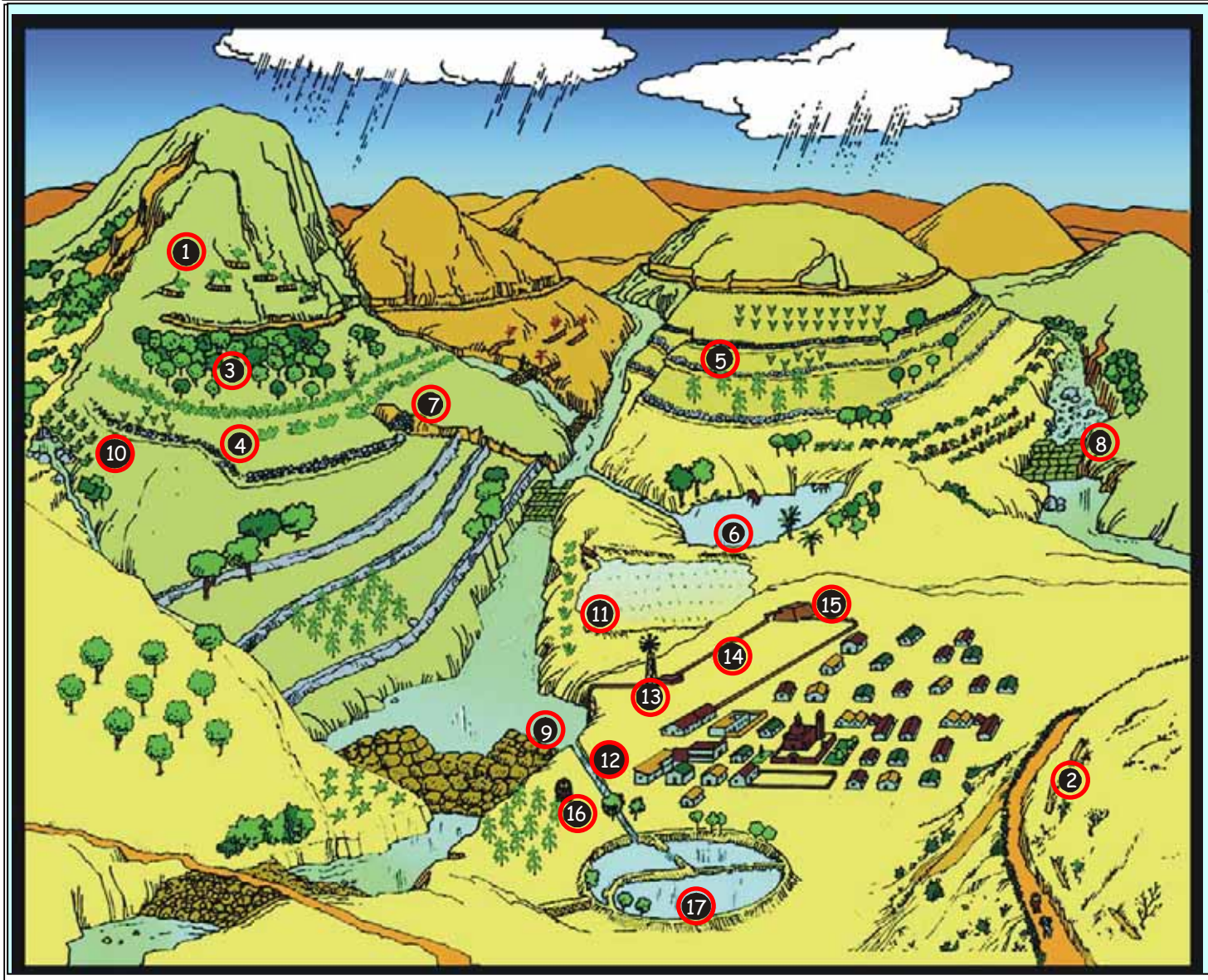

(b)
(b')
(a)
(a')
CORPUS
PRAXIS
ETNO-ECOLOGO
PRODUCTOR RURAL

TABLE 3
Kayapo and Yurimaguas Production Systems

	Kayapo	Yurimaguas
Soil classification	Yes	Yes
Clearing	Slash & burn	Slash & burn
Crop diversity	High	Low
Medium cycle crops (2—4 year production periods)	Yes	No
Arboreal species	Yes	Rarely
Polyvarietal planting	Yes	No
Plant structure	Concentric ring	Pure stand monocultures
Nutrient inputs	Yes — Ash, mulch, termite nests, litter, palm fronds	Yes — 30 kg N, 22 kg P, 48 kg K
Residue return	Yes — rice, corn stover, banana leaves, vines of yam, sweet potato, manioc peelings	Yes — Rice and cowpea stover
Cultivation practices		
Intercropping	Yes	Rarely
Relay planting	Yes	Yes
Mulching	Yes	No
Continuous planting	Yes	No
In-field burning	Yes	No
In-field mulch pits	Yes	No
Weed control		
Manual	Yes	Yes
Fire	Yes	No
Mulch	Yes	Sometimes
Allelopathy	Possibly	No
Scandent crops	Yes	No
Herbicides	No	Yes
Fallow	5—10 years	Yes — kudzu 1—2 years



MANEJO INTEGRADO Y SOSTENIBLE DE CUENCAS HIDROGRÁFICAS



RESUMEN DE TECNOLOGIAS

1 ZANJA TRINCHERA
2 ANILLOS DE CAPTACIÓN
3 REFORESTACIÓN
4 CURVAS DE NIVEL CON VEGETACIÓN
5 TERRAZAS
6 AGUAJES
7 PRESA DE PIEDRA ACOMODADA
8 PRESA DE GAVIONES
9 PRESA DERIVADORA
10 MANANTIAL
11 OBRAS DE IRRIGACIÓN
12 CANAL DE TIERRA
13 REHILETE
14 TUBERÍA DE CONDUCCIÓN
15 TANQUE DE REGULACIÓN
16 POZO SOMERO
17 JAGÜEY

DIAGRAMA POR: HUGO S. HERRERÍAS

ELABORÓ:
ALTERNATIVAS Y PROCESOS DE PARTICIPACION SOCIAL A.C.
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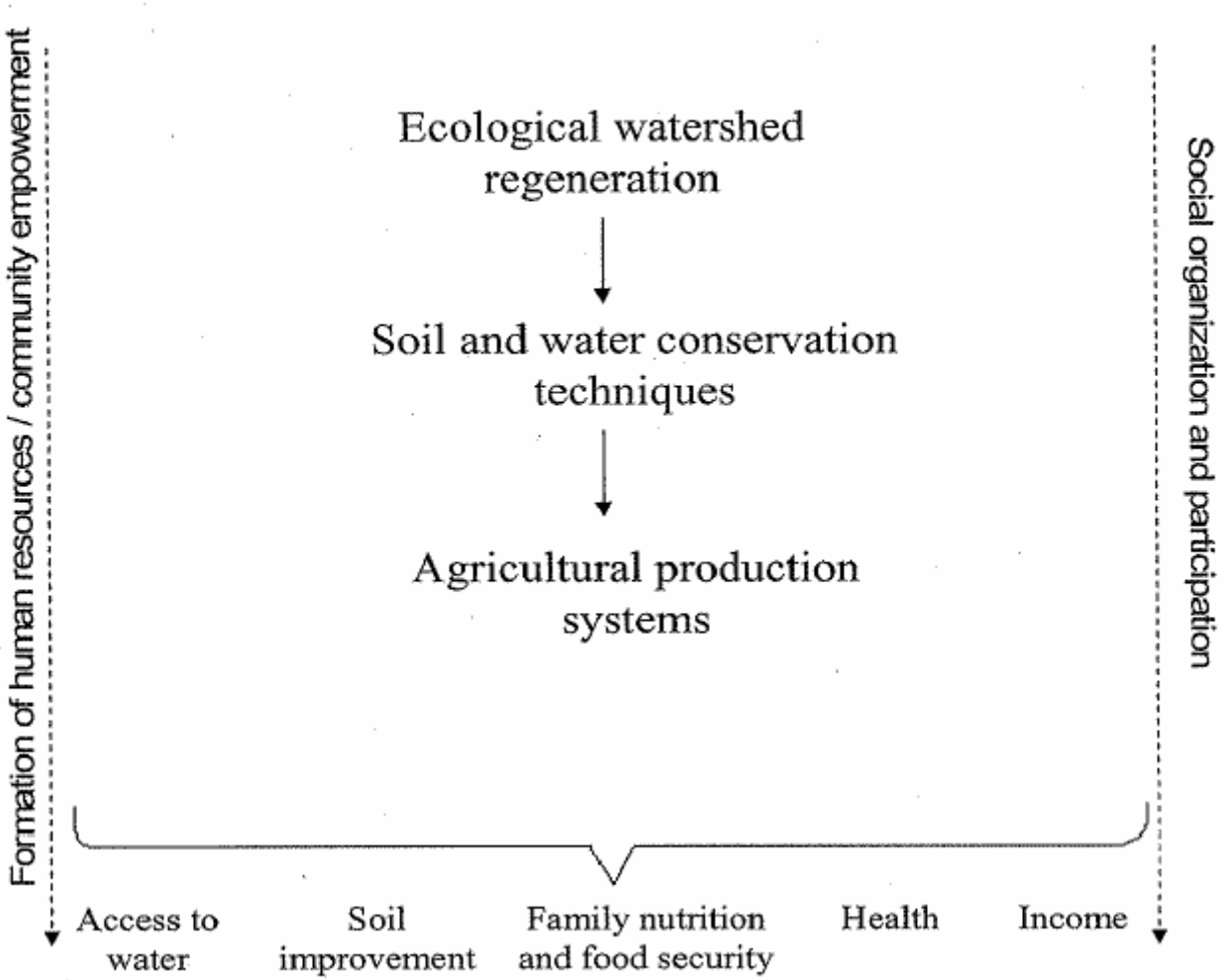

Formation of human resources / community empowerment
Ecological watershed regeneration
Soil and water conservation techniques
Agricultural production systems
Social organization and participation
Access to water
Soil improvement
Family nutrition and food security
Health
Income

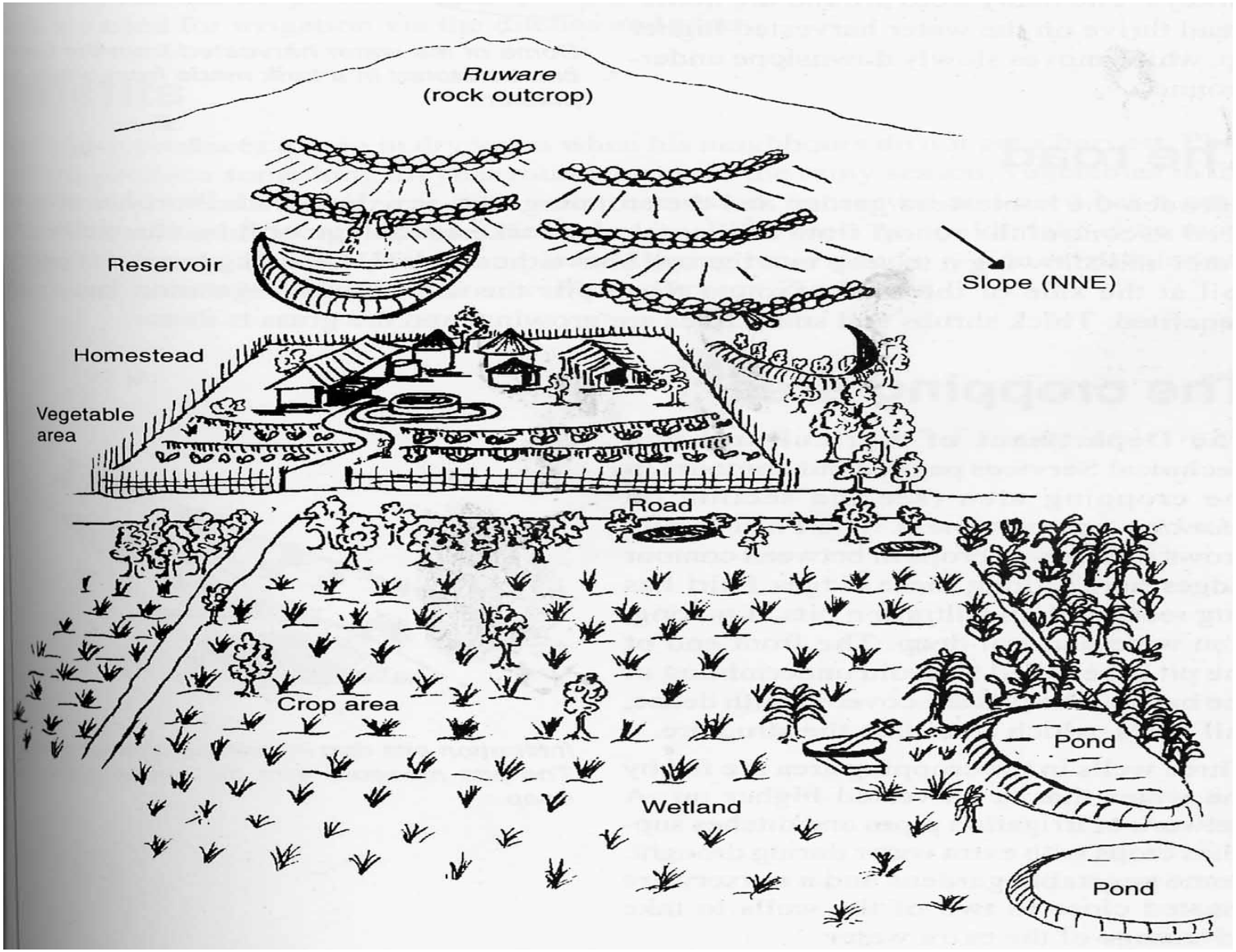
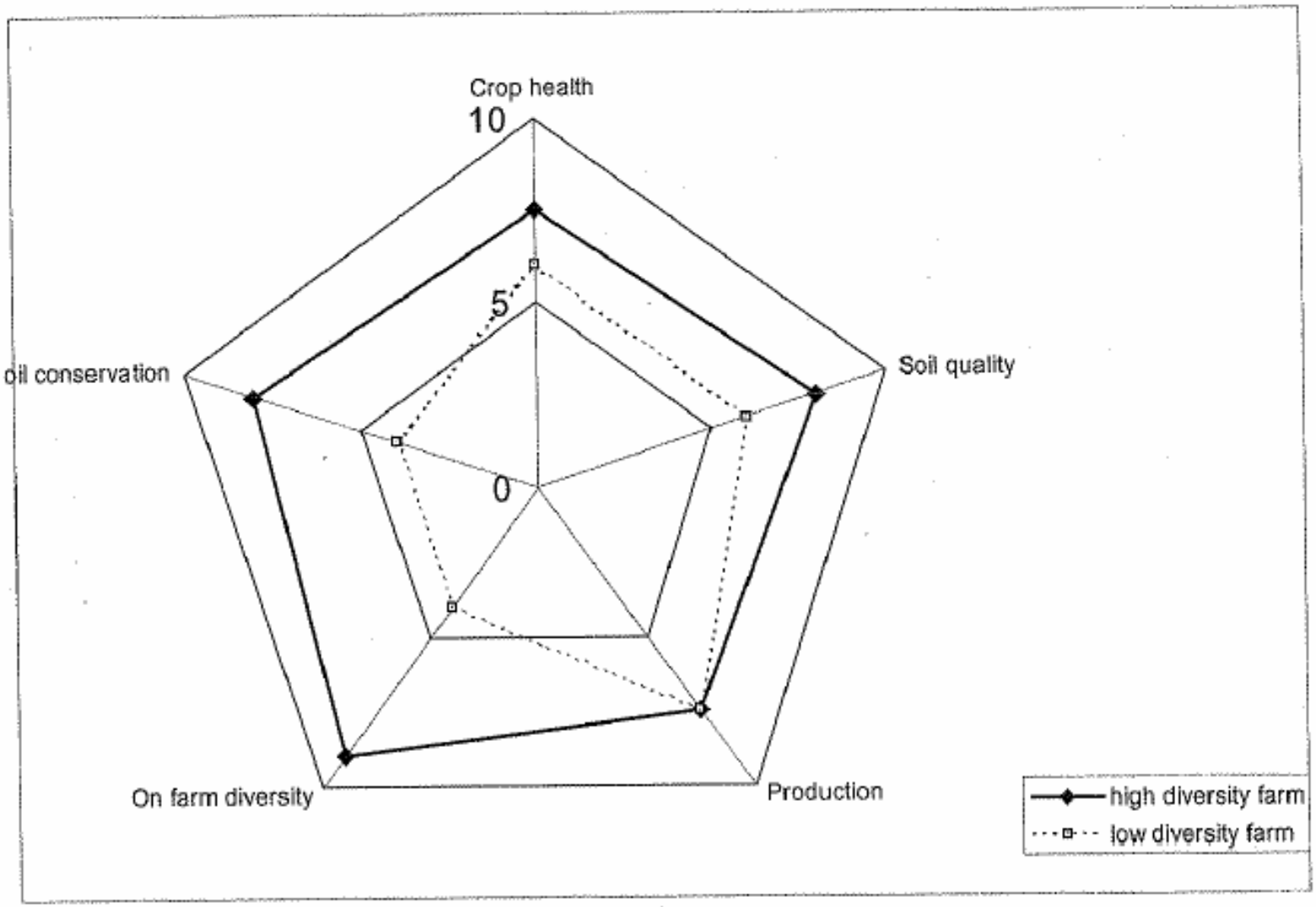

Ruware
(rock outcrop)
Reservoir
Slope (NNE)
Homestead
Vegetable
area
Road
Crop area
Wetland
Pond
Pond

Table 2

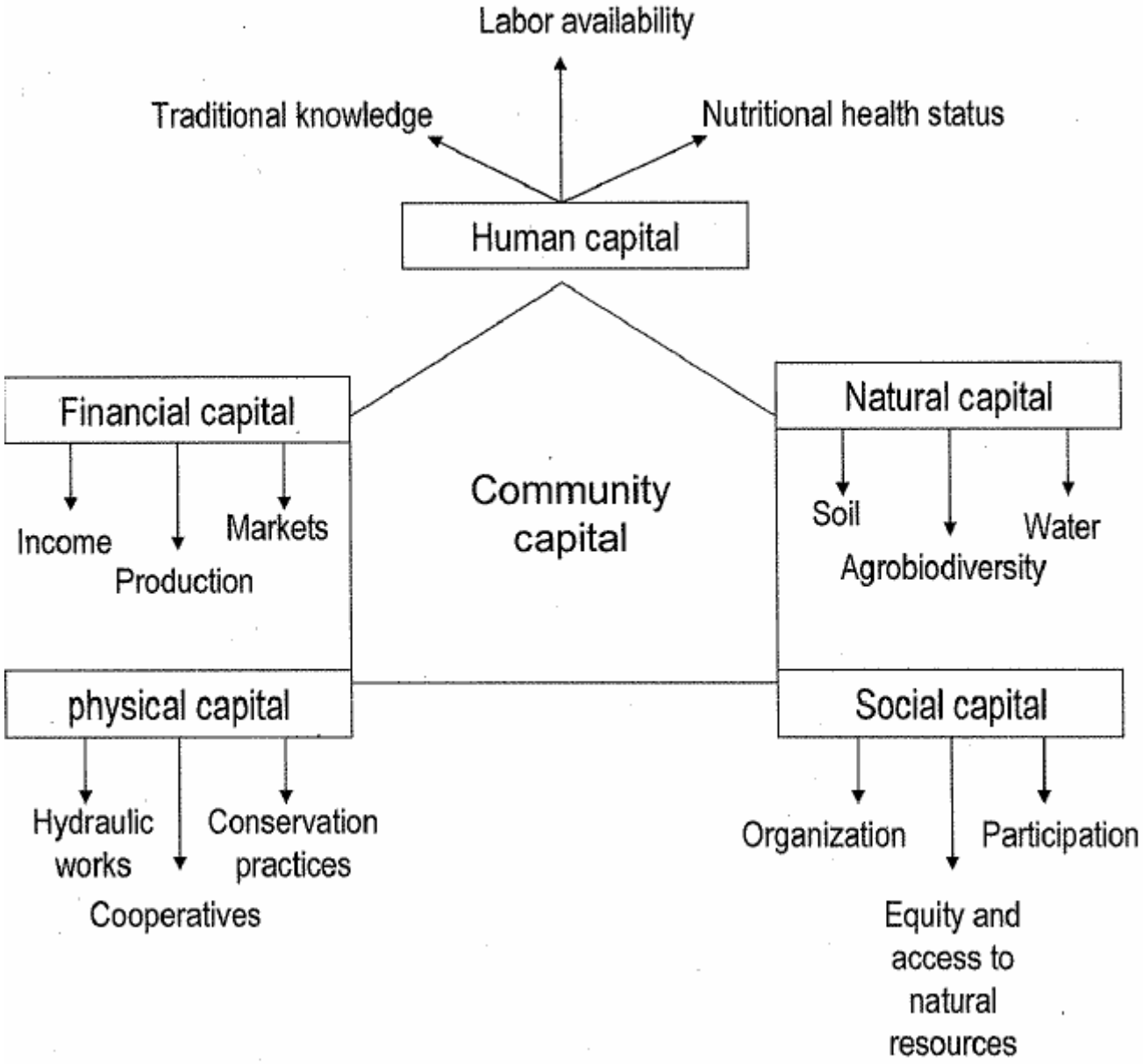
		Apoala	Tierra Colorada	Buenavista Tilantongo	El Carmen	La Union	Santa Maria Tiltepec	San Antionio
Reforestation	With 1 species	✓	✓	✓		✓		
	With 2 or more species [6]				✓		✓	✓
Natural regeneration[1]		✓			✓	✓	✓	✓
Countour ditches		✓	✓	✓			✓	
Contour ditches + vegetation[2]			✓		✓	✓	✓	✓
Crop diversification	2 species	✓	✓		✓	✓	✓	
	> 3 species [6]							✓
Crop rotation					✓		✓	✓
Cover crops (green manures)								✓
Conservation of local varieties		✓	✓	✓	✓	✓	✓	✓
Seed selection[3]					✓		✓	✓
Organic fertilization	overcast	✓	✓	✓	✓	✓		
	Localized[4]						✓	✓
Rainfed maize (temporal)		✓	✓	✓	✓	✓	✓	✓
Cajete maize[5]		✓			✓		✓	✓
Fallow		✓	✓	✓	✓	✓	✓	✓
Grazing on fallow		✓	✓	✓	✓	✓	✓	✓
Exclusion of goats		✓	✓	✓	✓	✓	✓	✓
Crop varieties planted	1 variety					✓		
	2 or more [6]	✓	✓	✓	✓		✓	✓
Total practices		12	11	9	14	11	15	15
		CEDICAM	Alt	Alt	CEDICAM	Alt	F. I.	F. I



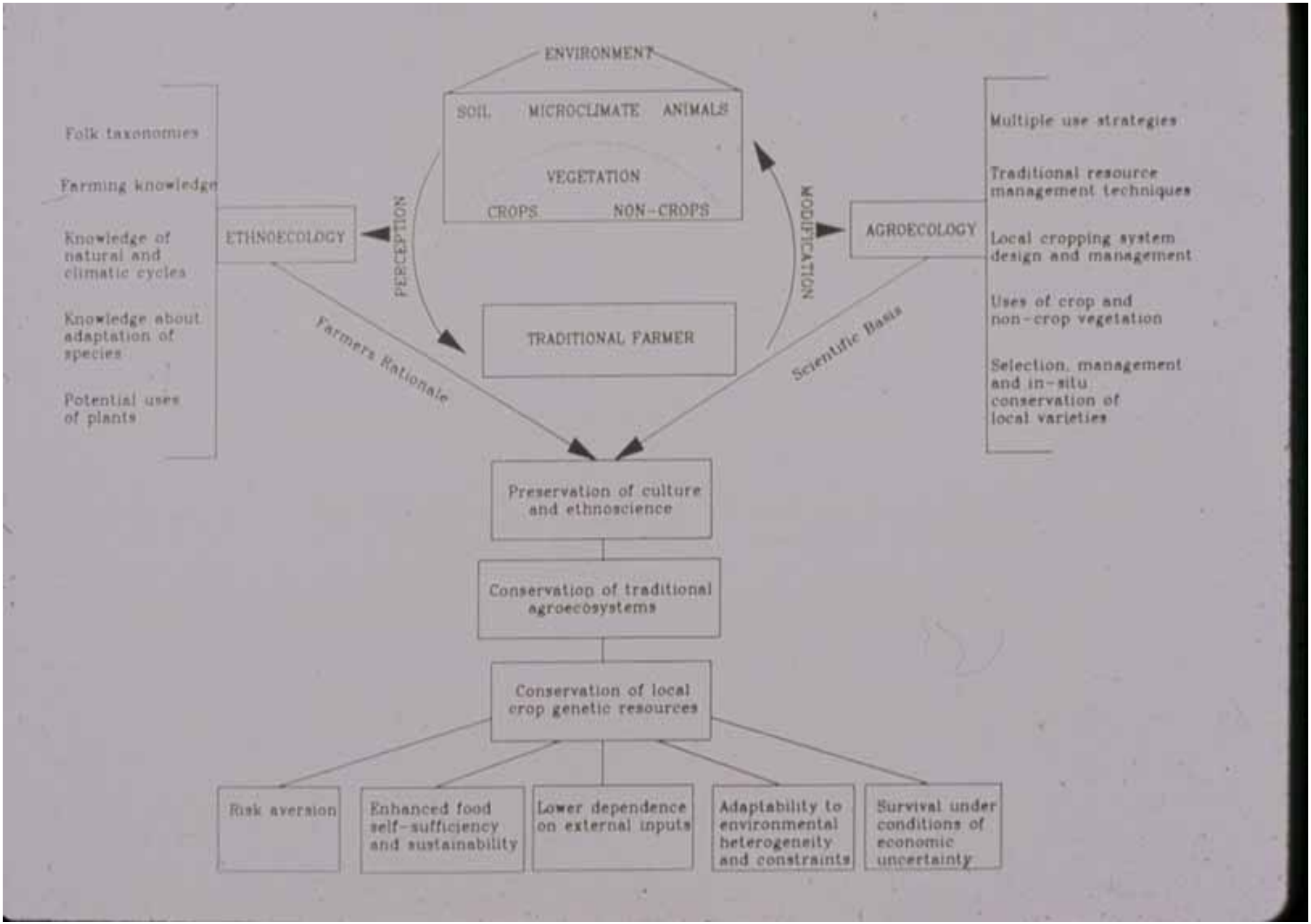
F.I.
Alternatives

	Farmers initiatives	ALTERNATIVAS	CIDECAM
Level of community participation in works and decision making	3	2	3
Community dependence on outside institutions or resources	2	1	2
Importance of community leadership for initiatives to happen	3	1	2
Farmer to farmer exchange / alliances	1	1	2
Strategic watershed perspective	1	3	2
Diversity of technologies	2	2	2
Satisfaction of multiple needs (multifunctionality)	2	2	2
Impact on soil conservation and water availability	2	2	2
Impact on food production and family nutrition	1	2	2
Impact on income generation	1	2	1
Time to obtain benefits	2	1	2
Equity in access to technologies and benefits from works	3	1	2
Cost of interventions	2	1	2
Overall potential / sustainability of initiatives	2	1	2

1 Low, undesirable, slow, high cost, high dependence
2 Medium
3 High, desirable, quick, low cost


Labor availability
Traditional knowledge
Nutritional health status
Human capital
Financial capital
Income
Markets
Production
Community capital
Natural capital
Soil
Water
Agrobiodiversity
physical capital
Hydraulic works
Conservation practices
Cooperatives
Social capital
Organization
Participation
Equity and access to natural resources

		Scenarios---------->			
Capital	Sustainability Indicators	Expand Markets	Introductions of Modern Varieties	Agroecological Interventions	Increase water and soil conservation works
Natural					
	Biodiversity	-	-	+	+
	Soil quality	-	-	+	+
	Yields	+	-	+	+
Social	Food security	-	-	+	+
	Organization	+	+ / -	+	+
	Participation	+ / -	+ / -	+	+
Human					
	Nutrition, Health	+ / -	-	+	+
	TEK Skills	-	-	+	+
	Cultural identity	-	-	+	+
Physical					
	Fuel, energy	+ / -	+ / -	+ / -	+ / -
	Water and materials	-	-	+	+
	Rural infrastructure	+	+ / -	+ / -	+
Economic					
	Income, savings	+	-	+	+
	Access to land, markets, inputs	+	+ / -	+ / -	+ / -
	labor availability	-	-	+	+


ENVIRONMENT
SOIL
MICROCLIMATE
ANIMALS
VEGETATION
CROPS
NON-CROPS
Folk taxonomies
Farming knowledge
Knowledge of natural and climatic cycles
Knowledge about adaptation of species
Potential uses of plants
ETHNOECOLOGY
PERCEPTION
MODIFICATION
AGROECOLOGY
Multiple use strategies
Traditional resource management techniques
Local cropping system design and management
Uses of crop and non-crop vegetation
Selection, management and in-situ conservation of local varieties
TRADITIONAL FARMER
Farmers Rationale
Scientific Basis
Preservation of culture and ethnoscience
Conservation of traditional agroecosystems
Conservation of local crop genetic resources
Risk aversion
Enhanced food self-sufficiency and sustainability
Lower dependence on external inputs
Adaptability to environmental heterogeneity and constraints
Survival under conditions of economic uncertainty