Policy Dimensions of Conservation and Management of Belowground Biodiversity in the Kerala part of Western Ghats

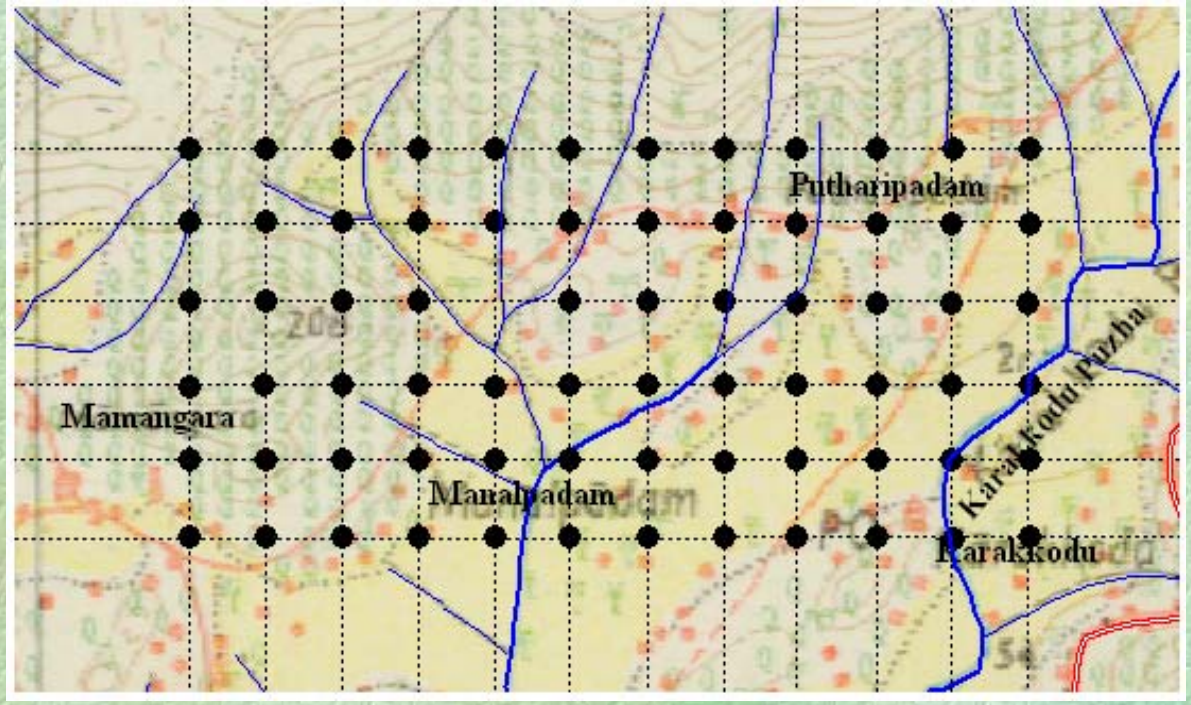
U.M. Chandrashekara,
E.C. Baiju and P. Mujeeb Rahman
Kerala Forest Research Institute Sub Centre, Nilambur

Conservation and Management of Belowground Biodiversity in the Kerala part of Nilgiri Biosphere Reserve

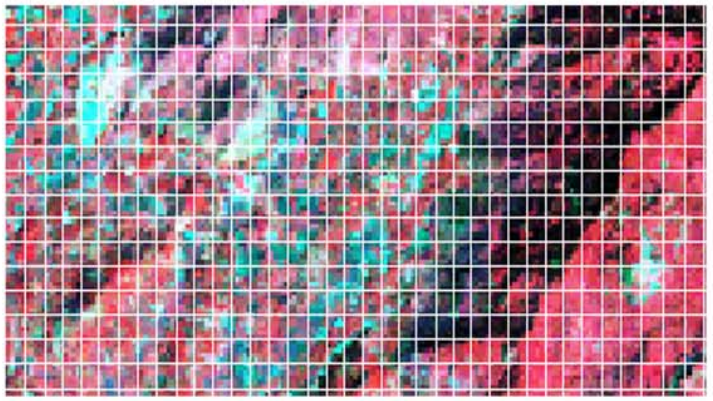
UM Chandrashekara, RV Varma, M Balasundaram, KV Sanakaran and MP Sujatha

Villages in Karakkode micro-watershed area of Malappuram District

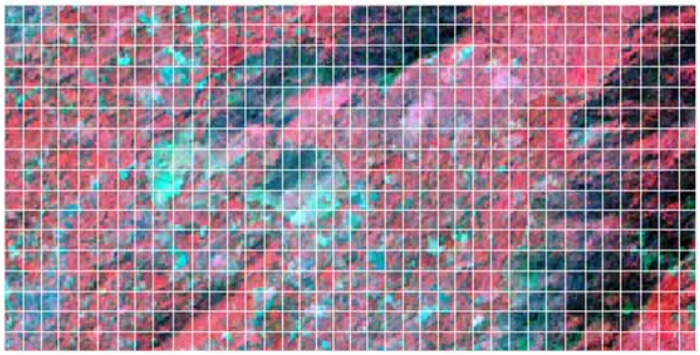
11o 15’ N - 11o27’ N
76o 17’ E - 76o24’ E



1973



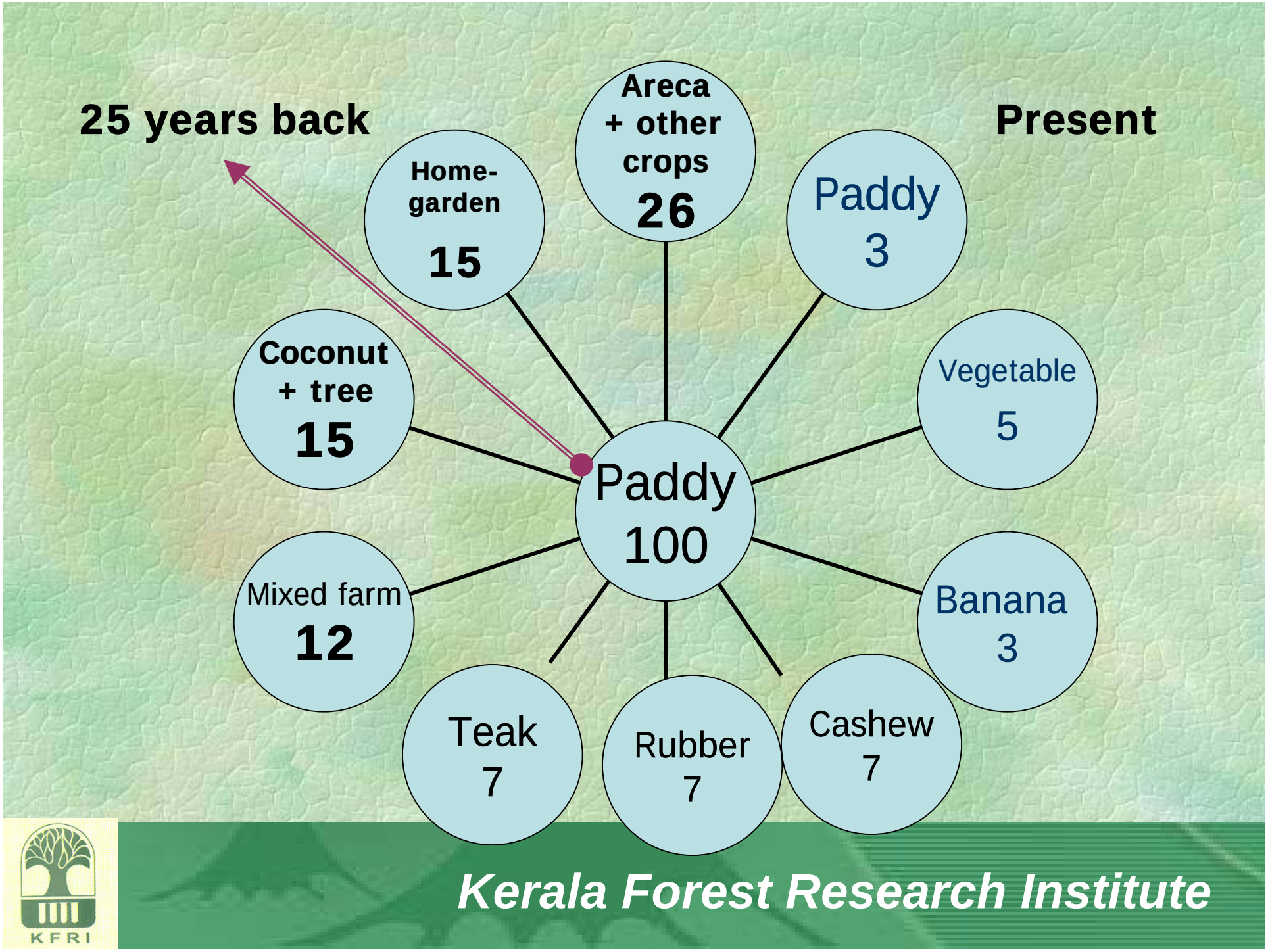
1990



2000

Landuse/land cover	1973	1990	2000
Paddy	20.60	7.71	2.07
Homegarden	35.01	44.88	48.10
Polyculture farm	11.20	8.35	11.97
Arecanut dominant system	18.93	7.41	8.55
Coconut dominant system	0	9.65	4.09
Rubber	0.12	13.23	18.32
Cashew	10.36	4.98	1.69
Teak	0	0	1.43
Degraded forest	3.78	3.74	3.78

Area (in % of total land area) under different landuse/land cover in the BGBD project site at Kerala part of Nilgiri Biosphere Reserve (Total area 26 km²)


25 years back
Present
Areca + other crops 26
Home-garden 15
Paddy 3
Coconut + tree 15
Vegetable 5
Paddy 100
Mixed farm 12
Banana 3
Teak 7
Rubber 7
Cashew 7

About 80% of the paddy fields have been transformed into tree-based farms (Chandrashekara and Baiju, 2005)

Impact of landuse transformation on biodiversity

Aboveground biodiversity

- At the village landscape level, plant density, basal cover and diversity has increased considerably.
- However, increase in plant diversity is less than the expected since majority of farms are homogenous in terms of species composition

Impact of landuse transformation on biodiversity

Belowground biodiversity

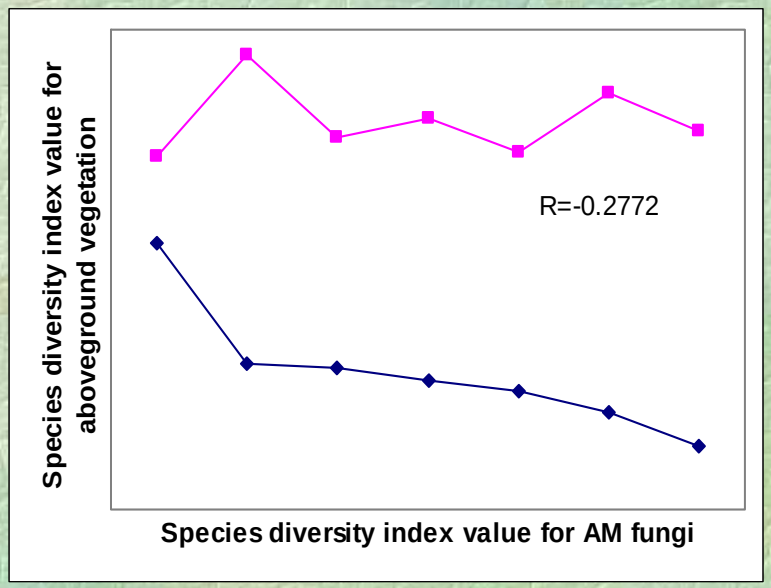
- Change in composition of AM fungal species and soil faunal groups seems to be slow (SI Value= 0.83 to 87, particularly in areca dominant systems).

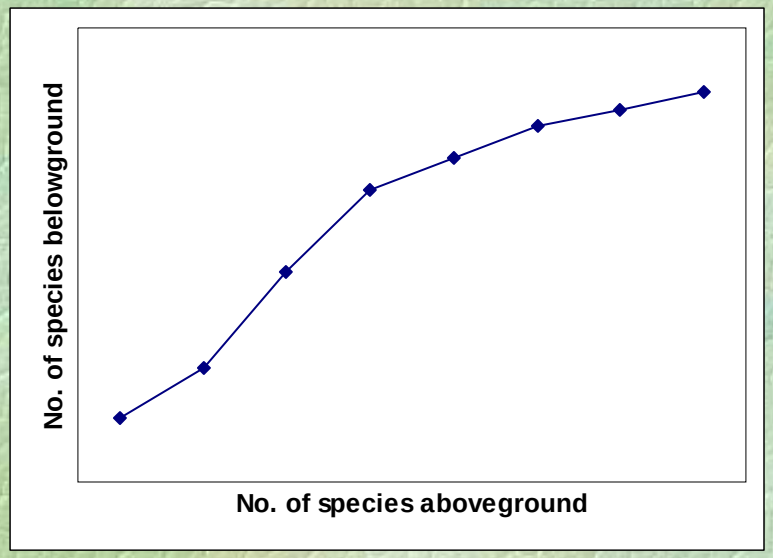
current landuse and soil quality

- **Organic carbon, exchangeable calcium, magnesium and potassium were considerably lesser than the level required for the optimum crop yield.**
- **Chemical pesticides are being applied at frequent interval**

- Aboveground and belowground biodiversity correlate when taxa in both realms respond similarly to the given system.

Such a relations is not existing or disrupted in the farms derived from paddy fields





We have limited information to indicate a one –to one correspondence between Above- and belowground diversity in traditional farming systems

Some methods of soil and in turn belowground biodiversity management in the traditional farming system are listed here

Practice	Knowledge
Mixed system farming system	1. Number and types of surface feeding earthworms are more in areas densely covered with multiple understorey species 2. Number and types of deep soil earthworms are more in areas sparsely covered with understorey plants
Mulching	1. Number and types of visible soil fauna (macrofauna?) are more in mulch consisting of *Macarnaga peltata*, *Calycopteris floribunda* and *Terminalia paniculata* than in any single species mulch. 2. Leaves of *Macaranga peltata* is better than that of *Terminalia panicualta* to use as mulch in the annual crop system 3. For quick decomposition of green leaf incorporate it to the soil during September-October, and not in wet or dry season. 4. To get disease-free plantain plant and bunch, incorporate a mixture of partially decayed paddy straw, dry cow dung powder and ash into the soil and then water at regular interval.
Incorporation of forest soil and litter	1. Incorporation of fresh forest soil and litter into the seedling beds enhances the chances of root diseases 2. Incorporation of forest soil into mixed crop farms increases the number and types of earthworms. This not the case in monoculture farms.

However, there may be an enormous traditional knowledge base related to direct or indirect ways of conservation and management of BGBD

The CBD article (j) advocates that
we protect, preserve and maintain traditional knowledge

Principle underlying the Biological diversity Act of 2002
Protect and regulate India's natural resources and traditional knowledge

Analysis of current efforts to protect, preserve and maintain traditional knowledge

Documentation and registration

Status

The importance of documentation has been fairly realized and efforts are to document the TK are negligible

Weaknesses

Erosion of knowledge is faster than the documentation
No institution to document
----- AGBD, BGBD and
----- Linkage between AGBD, BGBD, Crop yield and soil fertility

Strengths

National policy and Macro level Action Strategy on Biodiversity, 1999

Conservation of biodiversity, involvement and benefit sharing among the holders of the knowledge

The patents amendment Act, 2002

Provision to prevent the patenting of traditional knowledge

Biological Diversity Act, 2002

Provided for NBA and SBAs to take care of documentation, participation, IPR and benefit sharing issues

The Authorities can initiate programmes for BGBD to

---- Encourage inventory of belowground flora and fauna
---- Train and establish a group of specialists in the field of BGBD
---- Document TK related to BGBD
---- Analyze the scientific strengths and weaknesses of such TK

KFRI

Kerala Forest Research Institute