Challenges of mature systems and lessons learnt: a perspective

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Introduction

The aim of the talk is to introduce the challenges of mature systems and how to facilitate impact

Reflection

- It has been 30 years since the first set of agroforestry trials were planted in the UK using funding from the MAFF and the EC Non nuclear energy R+D budget line. It is timely to reflect on what impact they have had and also to suggest to other agroforestry researchers on how they may think about and monitor global impact

Poplar Agrenforestry in Old Wolverton: Bioenergy from woody and non woody sources combined

Vertical farming with walnut for pickling

- Wheat gross margin improved

- Landowner gets improved asset value and biodiversity

- Transformational farmer gets a share and creates new income streams

Vertical farming with ash for hurley sticks

- Live weight gain improved

- Landowner gets improved asset value and biodiversity

- Transformational farmer gets a share and creates new income streams

Poplar Silvoarable in India

A tri-partite environmental contract

Private sector, government and farmers. Partnership is key to the widespread application of agroforestry due to management , market and institutional complexity. This work and the work of FRR Ltd in the Aravalli hills project led to a successful Environmental forestry CDM project in Haryana
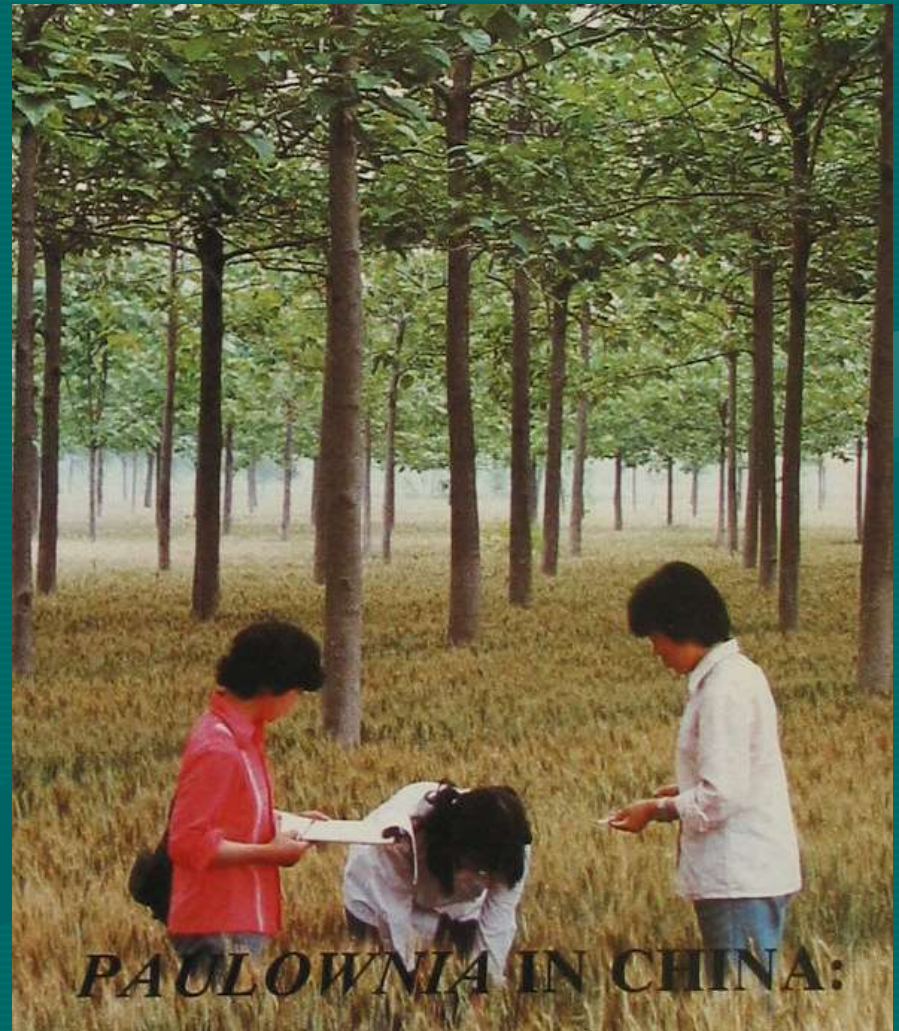
Environmental Agroforestry

This land had no organic matter and was subject to strong winds . Soil erosion was a major problem.

Water availability could be another environmental indicator

Environmental indicators in tripartite environmental stewardship contracts should be simple and measurable by a child

PAULOWNIA IN CHINA:

Aims of the Old Wolverton Trial

- The specific aims of the trial were

- To assess if a full yield of arable crop would be available if the trees were harvested for bioenergy on a 3-5 year rotation

- To assess if biomass from the trees and arable crop straw could be produced at a very low net cost given the net income of the arable crop

Results

- Dramatic decreases in cereal yields were observed at the age of 5 years, but no significant decreases at the age of 3 years when the trees were already 9 m tall (Newman, 1994).

- In summary biomass from trees that occupy no land ?

- *Lets follow the Chinese with four square planting*

My recent work with agroforestry : Establishment of 143,000 ha in Tamil Nadu

- £82 million

- Over 8 million trees planted

- Farmers are involved in a tree planting **activity** assisted by the state forestry department

- The envisaged physical **output** is an area of agroforestry of 143,000 ha

Local Impact

- Is is the effect of the intervention on the target beneficiaries ie the project farmers. This is very much within the management system boundary of the implementing agency and this can be stated as the projects attainment of targeted outcomes (**results**).

Global Impact

- Is more easily understood as "spread" or "multiplier effect". It is a somewhat mysterious (during implementation) process outside the management system boundary.

- The existence of the project causes or contributes to changes in other parts of India and could do this by sectoral links outside the agriculture or forestry sector.

- Is defined as the nature and extent to which the **project purpose** contributes to the **overall objective**

Some common Impact Pathways

1. Movement of champions

2. Assets

3. Technologies

4. Policy or procedural reform

Ex post construction of a theory of change for impact at Old Wolverton

The activity of action research involving an agroforestry trial would lead to the physical outputs of one trial and at least two publications. This would lead the outcomes of

1. Other scientists in the region adopting the research protocols

2. farmers in the region adopting bioenergy using short rotation trees on agricultural land

3. the owners of the land (Milton Keynes Development Corporation) adopting agroforestry practice and bioenergy short rotation trees on urban and peri urban land

4. This in turn would lead to the project purpose of tree based bioenergy in England increased by 10% by 2000

Research Results 1

- The research showed that if the trees had been harvested at age 3, the maximum annual loss of wheat yield would he that due to the mulch strips alone, i.e. 12%. By this time, the mean volume of an individual tree was 0.0887 m^3, and. the average annual biomass increment was 7.9 oven dry tonnes. The trees, however, did not affect the wheat crop so assuming that they only occupied 1.6 m^2 each, the productivity produced in the vertical dimension on the polyethylene strip represents nearly 70 tonnes of timber biomass ha^{-1} $year^{-1}$.

Research Results 2

- In summary, in a very short rotation poplar coppice (3 years), for only a 12% loss in crop yield, 8 tonnes ha^{-1} year^{-1} of woody biomass can be produced. This appears to be more economical than devoting entire fields to the production of a single energy crop (Newman *et al.*, 1991c).

- But what of coppice regrowth?

The project purpose was achieved linked to the following outcomes

- Farmers in Bucks have adopted poplar growing for timber and or biomass in several locations and

- Agroforestry (cricket bat willow) adopted by the MKDC was the most successful of all urban landscapes in terms of benefits per net cost.

Global Impact

- The global impact is even more interesting if one posits

- Trees are now a major energy sources and this is achieved on agricultural land.

Impact pathways

- Movement of champions: Key members of the research agencies involved have influenced agroforestry policy and practice in Countries as diverse as Kenya, Cameroon, India and China

- Movement of assets and or technology: Mulching is now an integral part of tree planting on farmland

- Policy and procedural reform: Germany has adopted sensible farmer incentives for tree based bioenergy in the form of index linkage of biomass prices to wheat prices. The EU has included agroforestry as part of the CAP

Final provocative thoughts and recommendations

- Most models of agroforestry were wrong and underestimated advantages
- The farmers understanding of the effects of shade is wrong
- Most forestry ideas are inappropriate
- Yield decline when it occurs is not gradual but catastrophic unless Tree height is significantly less than alley width or there is excellent temporal partitioning
- It is recommended that future research includes the following provocative propositions formulated in the form of questions:

1. How can we feed people in the face of the perfect storm?
2. How can we get the maximum return on investment?
3. How could we restore profitably restore 1000 acres based on investments on 30 acres?

Thank you

Any questions please?