



FORESTRY PLANNING & DEVELOPMENT PROJECT
Government of Pakistan-USAID

REPORT #3

HOUSEHOLD-LEVEL FACTORS AFFECTING INTEREST IN PLANTING TREES
AND OPERATING NURSERIES: BALUCHISTAN

Michael R. Dove

Office of the Inspector General of Forests

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Distribution List:

Inspector General of Forests
Deputy Inspectors General of Forests
Secretary of Forests, Baluchistan
Project Director Baluchistan
Project Director, PFI
Project Officer, U.S.AID
Winrock International Islamabad/Arlington

SUMMARY

I. INTEREST IN PLANTING TREES

1. Determinants:

- (i) 97% of the farm households interviewed expressed interest in planting trees under the FP&D project.
- (ii) Interest in planting trees is uniformly high among farmers irrespective of their tribe, level of education, whether they own land, how much land they own, and whether it is cropped or sharecropped.
- (iii) Illiterate, landless tenants comprise the majority in the project/study villages, and they are likely to do most of the project's tree planting and cultivation.
- (iv) Tenants of long-standing are most likely to share in the benefits of trees that they plant and care for.

2. Provincial Targets:

Farmer interest will suffice to meet the PC-1 planting target of 2,000,000 trees for 1987-1988 & 9,000,000 trees for 1988-1991 (assuming that all project guidelines are followed, and that the trees themselves are made available).

II. NUMBER OF PLANTS REQUESTED PER HOUSEHOLD

- (i) 83% of households request fewer than 1,000 seedlings for their first planting, with the average being 312.
- (ii) Tenants are requesting higher densities of trees than are their landlords.
- (iii) There is no association between number of trees requested and number of acres owned or worked.

III. FARMERS' SPECIES PREFERENCES

- (i) The 6 tree species most requested by farmers are bed mushk 'Eucalyptus spp.', shisham 'Dalbergia sissoo', beri 'Zizyphus mauritania', neem 'Azadirachta indica', kikar 'Acacia nilotica', and serus 'Albizia lebbeck'.
- (ii) Landowners and tenants rank these species differently.

IV. INTEREST IN ESTABLISHING NURSERIES

- (i) 8.4% of farm households are interested in establishing private project nurseries.
- (ii) Initial interest is highest among large, well-educated landowners - but the cost/benefit ratios may be better suited to smaller landowners.
- (iii) This interest will suffice to meet the PC-1 target of 48 nurseries for 1987-1988, and 216 for 1988-1991 (assuming that all project guidelines are followed)

V. DATA COLLECTION BY PROVINCIAL PROJECT STAFF

The data base used for project planning can be enlarged, and its reliability enhanced, through the collection of data by project field staffs. A form for this purpose is appended.

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I. INTEREST IN PLANTING TREES

97.3 % of the farm households in the sample are interested in planting trees, irrespective of their tribe, level of education, whether they own land, how much land they own, and whether it is cropped or sharecropped. Even allowing for a positive bias in the data (due to the landlords' interest in having their tenants participate), this figure clearly reflects -- especially given the great amount of diversity in the sample -- a great desire for trees and tree products.

1. Profile of Interested Households

64% of the households in the sample are landless. The minority of landowners hold an average of 231 acres each, with the following distribution:

% of Households	Household's Landholdings (acres)							
	0-5	5-10	11-20	21-30	31-50	51-100	101-500	> 500
	1.5%	6%	28%	9%	9%	15%	22%	10%

Note: these figures include land owned elsewhere by resident tenants.

The 1960 agricultural census suggests (even after allowing for the usual biases in reporting) that households with holdings as large as these are not as common in the district as a whole as in the villages selected for initial involvement in project activities and this study. However, since interest in planting trees is just as high among the smaller landowners, their greater participation in subsequent project activities can easily be attained.

Most of the households in the sample, the small landowners as well as the large ones, have irrigated lands.

% of Households	Household's Source of Water:		
	Barani	Barani/Irrigated	Irrigated
	4%	3%	95%

Note: these figures exclude land owned more than 20 miles away by resident tenants.

None of these lands were reported to be unarable at the time of this study (again, excluding lands owned more than 20 miles away by resident tenants).

Most heads of households in the sample population are illiterate:

% of Households	Household Head's Education:				
	None 0	Prim. 1-5	Midd. 6-8	Matric 9-10	Interm 11-12+
	83%	8%	1.5%	4.5%	3%

The fact that all of these farm households - illiterate as well as literate - are nonetheless interested in planting trees, indicates that literacy is not a prerequisite to 'tree-mindedness'. The scarcity of literacy (only 17% of the total sample), must be reflected in the project's outreach strategies. If a landowner decides to participate in the project, but plans to have his tenants cultivate the trees, it will not suffice to deliver technical advice to him alone: it is equally or more important to get this advice to his tenants.

2. Tenant Farming

i. Extent of Tenant Farming

Tenant farming predominates in the villages where project activities were initiated and our study was carried out:

% of Households Working as Tenants:	79%
Landowners cum tenants:	15%
Landless Tenants:	64%
% of Land Worked by Tenants:	90% *

* These figures exclude land owned more than 20 miles away by resident tenants.

The 1980 Census of Agriculture suggests that tenant farming is less important in the district as a whole. Whatever the precise incidence of tenancy, however, it is clear that a large if not major part of project planting will take place on tenant farms. In order to ensure that the tenants share in project benefits, their circumstances must be properly understood.

ii. Tenant Land Use

The average tenant cultivates 16.2 acres of land, with the following distribution:

% of Tenant Households	Number of Acres Sharecropped				
	>0-5	6-10	11-20	21-30	>30
	7%	21%	58%	7%	8%

Some 20% of the tenants own land themselves, with the following specifications:

Acceage:	96 acres
Source of Water: barani:	62% all households
barani/irrigated:	4% "
irrigated:	34% "
Availability: all cultivated:	58% all households
partially waste:	10% "
all waste:	31% "
Distance from tenant village:	15.1 miles

iii. Potential Role of Tenants in Farm Forestry

80% of these landowner-tenants plan to plant trees not on the land that they own, but on the land that they sharecrop. The major reason for doing so is the same one that led them to become tenant farmers in the first place, namely the lack of water on their own lands (and, in every case, the presence of irrigation on the lands that they sharecrop).

Since most tenants will be planting on lands that do not belong to them, it is important to ensure that they share in the benefits of their tree cultivation. It has been suggested that common tribal ties will ensure that project benefits are shared. But the district's tenants do not all come from the same tribal group:

TRIBE:	% of Households Working as Tenants
Brahui	43%
Baluch	79%
Sindi/Jat	100%

And most landlord-tenant relations involve people from different tribal groups:

	% of all Landlord-Tenant Relations	
Intra-Tribal:	46%	
Inter-Tribal:	54%	
Baluch-Sindi	39%	
Brahui-Sindi	12%	
Baluch-Brahui	3%	

This pattern belies any reliance on intra-tribal ties for equitable distribution of project benefits.

A more important factor in benefit distribution - given the long-term nature of investment in tree-crops - is likely to be the longevity of landlord-tenant ties. The landlord-tenant relationships in our sample are unusually long, averaging 15.7 years in duration:

	Length of Tenancy (Years)				
	0-5	6-10	11-20	21-30	> 30
% of Tenant Households:	30	14	30	11	14

The average duration of tenancy varies more between villages than within them, the means in our study villages ranging from just 4 years to almost 36 years. This variation is not explained by ownership of land by the tenants, nor the amount of land owned by the landlord, nor the congruence or even dissimilarity of the tenant's and landlord's tribes. The critical explanatory factor appears to be the personal history, circumstances, and character of the landlord: some landlords are willing and able to keep tenants with them for a long time, and some are not. The tenants of the former are most likely to share in the benefits of tree plantings, and - as a result - these are the plantings most likely to succeed.

This difficulty in explaining variation in duration of tenancy is due both to the ethnic diversity referred to above, and to the relatively recent practice of sedentary agriculture in this area. The lack of established agrarian traditions makes analysis of past agricultural behavior - and prediction of future behavior - problematic.

3. Provincial Planting Targets

Demand for trees is well in excess of Baluchistan's 1987-1988 planting target of 2,000,000 trees (based on the PC-1 appendix 3, assuming a rate of 1,000 trees/acre):

Size of Rural Population *	% Interested in Planting Trees	No. Trees Asked Per Household	Total Demand for Trees
52,808 households	97.3% of all households	312 trees	16,031,241 trees

* As of the 1981 Population Census in the district of Hacırahad (Tables 1,4).

This is a conservative figure: if tenants are given as many trees as they want, as opposed to as many as their landlords

request, total demand rises to over 22 million trees. These data indicate that the 1987-1988 planting target can be easily met, therefore, assuming also the following:

- (i) The farmers are not required to plant some minimum number of seedlings. (for example, farmers requesting a few dozen or a few hundred seedlings are also served).
- (ii) The farmers are not required to make block plantings (for example, scattered and linear plantings are also permitted).
- (iii) The farmers are given the species that they want.
- (iv) The farmers are provided with seedlings at the proper time of year, with respect both to the climate and their own work schedules (for example, not in the middle of the harvest).
- (v) The farmers are not given small or sickly plants.
- (vi) The farmers are provided timely and accurate advice on planting and caring for the trees.
- (vii) All project regulations, especially regarding the provision of free plants and advice, are strictly adhered to.
- (viii) Landlords are able to enjoy some of the benefits of tree cultivation on the lands that they work.

Assuming that the percentage of farmers interested in planting trees does not change, that the number of plants requested per household also does not change, and again, that the above project conditions are all met, the present interest is also sufficient to meet Baluchistan's subsequent target for 1988-1991 of 9,000,000 trees (PC-1 appendix 3). In fact, the percentage of interested farmers is likely to increase, and many of the farmers that participate in the project are likely to request plants on more than one occasion, so the actual future demand for plants is likely to be even more in excess of the target than indicated here.

II. NUMBERS OF PLANTS REQUESTED PER HOUSEHOLD

1. Pattern

The number of plants requested per household averages 312, with the following distribution:

Number of Plants Requested Per Household:	% of Households Requesting:
< 100 plants	29% of all households
100 - 999 "	54% "
1,000-2,000 "	8% "
2,001-5,000 "	6% "
> 5,000 "	2% "

2. Determinants

i. Landowner versus Tenant

There is a strong tendency for landowners to request more trees overall than tenants:

No. of Trees Requested:	Status of Household:	
	Landowner	Tenant
< 100 trees	6 hh	44 hh
100 - 999 "	18 hh	74 hh
1,000-2,000 "	3 hh	11 hh
2,001-5,000 "	6 hh	5 hh
> 5,000	3 hh	0 hh

n = 170 households. $\chi^2 = 15.2$. $P < .001$.

However, there is also a tendency for landowners to request fewer trees per acre than tenants: in 63% of the cases in our sample, the overall planting density (trees/acre) requested by tenants exceeds - by an average of almost 50% - that requested by their own landlords. One reason for this difference is that tenants are more in need of tree products for domestic use - namely, fuelwood, fodder, and timber - than their landlords. This is further evidence of the basic appeal of this project to the small farmer, for whom it was indeed designed.

While the heightened interest on the part of tenants is gratifying, it is also problematic, since it means that the average landlord is only asking for two-thirds of the trees that his tenants want:

Mean Request by landowners:	Mean Request by tenants:
17.0 trees/acre owned,	24.8 trees/acre worked,
X 16.2 acres = 275 trees.	X 16.2 acres = 402 trees.

Note: 16.2 acres is the mean size of tenant farms.

The solution to this problem is for the field staff to involve not just the landlords, but their tenants as well, in discussions of how many trees they want from the project.

ii. Other Factors

There is no association between the number of trees requested and the amount of land owned, in the case of landowners ($\chi^2 = 14.9$, $P < .25$), or the amount of land worked, in the case of tenants ($\chi^2 = 17.7$, $P < .25$). This is due to a

lack of familiarity with systematic tree-cropping (and reluctance, therefore, to commit extensive resources to it), and also to a tendency to plant trees in part for household needs (which do not increase as land increases) as opposed to market sales (which do increase as land increases).

There also is no association between the overall planting density and the amount of land owned or worked (in other project areas, the proposed planting density decreases regularly as the land area increases). Nor is there any association between the number of seedlings requested - by tenants - and the longevity of their tenancy ($X^2 = 13.0$, $P < .50$). The absence of either association - the absence of any clear pattern in the number of trees that individual households desire to plant - reflects, again, both the great diversity of this population, and their lack of experience with tree-cropping. This makes outreach efforts particularly important, both so that the farmers can learn what their tree-planting options are, and so that the foresters can learn what the farmers' varied needs and likely responses are.

III. SPECIES PREFERENCES

The species listed below are those that the farmers themselves have requested. The fact that the farmers requested them does not necessarily mean that they are the optimal species from either biological or economic standpoints. (The abundant requests for Eucalyptus are one example of a farmer preference that may be problematic, in areas where the market for this tree is uncertain.) In addition, species preferences are likely to change as the project progresses and as new species and cultivation techniques are introduced to the farmers.

1. Preferences According to % of Households Requesting

Species	% of Households Requesting
<u>bed mushk</u> 'Eucalyptus spp.'	80 %
<u>shisham</u> 'Dalbergia sissoo'	73 %
<u>beri</u> 'Zizyphus mauritania'	45 %
<u>neem</u> 'Azadirachta indica'	42 %
<u>kikar</u> 'Acacia nilotica'	41 %
<u>serus</u> 'Albizia lebbeck'	40 %
<u>peepal</u> 'Ficus religiosa'	12 %
<u>manjhandari</u> 'Sesbania spp.'	9 %
<u>bamboo</u> 'Bambusa spp.'	3 %

* Tentative identification.

2. Preferences According to % of Total Plants Requested

Species	% of Plants Requested
<u>bed mushk</u> 'Eucalyptus spp.'	30-40%
<u>kikar</u> 'Acacia nilotica'	23-33%
<u>shisham</u> 'Dalbergia sissoo'	7-17%
<u>beri</u> 'Zizyphus mauritania'	3-13%
<u>neem</u> 'Azadirachta indica'	1-11%
<u>serus</u> 'Albizia lebbeck'	1-11%
<u>manjhandari</u> 'Sesbania spp.'*	0-6%
<u>peepal</u> 'Ficus religiosa'	0-1%
<u>bamboo</u> 'Bambusa spp.'	0-1%

* Tentative identification.

3. Preferences According to Landowners versus Tenants

Landowners and tenants mostly request the same species, but they differ in their ranking of them:

<u>Landowners</u>			<u>Tenants</u>		
Species	Rank	% Households Requesting	Species	Rank	% Households Requesting
<u>shisham</u>	1	91	<u>bed mushk</u>	1	80
<u>bed mushk</u>	2	83	<u>shisham</u>	2	69
<u>neem</u>	3	69	<u>beri</u>	3	47
<u>serus</u>	4	63	<u>kikar</u>	4	44
<u>beri</u>	5	37	<u>serus</u>	5	35
<u>kikar</u>	6	31	<u>neem</u>	6	35
<u>peepal</u>	7	23	<u>peepal</u>	7	9
<u>manjhandari</u>	8	11	<u>bamboo</u>	8	4
<u>bamboo</u>	9	3	<u>cheel</u>	9	2

Since most of the trees requested by landowners will be planted and cared for (and hopefully utilized) by tenants, the field staff should discuss species preferences not just with the landowners, but with the tenants as well.

V. INTEREST IN ESTABLISHING NURSERIES

1. Determinants of Interest

8.4% of the farm households in the sample (38% of the land owners and 1% of the tenants) are interested in establishing project nurseries. Interest is associated with larger amounts of land, as well as with higher education:

	% Owning Land	*Amount of Land Owned	HH Head's Education
Households Interested in Establishing Nurseries	92% of all hh	910 acres	9.7 years
All Households Interested in Planting Trees	36% of all hh	231 acres	1.6 years

* The figures in this column exclude landless tenants.

However, preliminary observations suggest that the potential contribution of a nursery to the economy of these large landowners may not adequately compensate them for the intense care and supervision (especially difficult for absentee landlords) that nurseries require. Thus, it is important to interest some smaller landowners - who have relatively more to gain - in establishing nurseries.

2. Provincial Nursery Targets

Demand far exceeds Baluchistan's PC-1 target for 1987-1988 of a minimum of 48 nurseries (calculated by taking the 1987-1988 planting target of 2,000,000 plants, adding 20% for replacement purposes, and dividing by the maximum nursery size of 50,000 plants):

Size of Rural Population *	% Interested in Establishing Nurseries	Total Interest in Nurseries
52,808 households	8.4% of all households	4,436 households

* As of the 1981 Population Census in the district of Nasirabad (tables 1,4).

These data indicate that Baluchistan's 1987-1988 nursery target can be easily met, assuming also the following:

- (i) Prospective nursery operators are clearly told in advance what the age and condition of plants must be before they will be purchased by the Forest Department.
- (ii) Nursery operators are provided timely and accurate technical assistance and guidance, both when initiating their nurseries and periodically thereafter.
- (iii) No agreements to establish nurseries are made and then broken with farmers, and there are no delays in purchasing mature plants.

Assuming that the percentage of farmers interested in establishing nurseries does not change, the interest will

also be more than sufficient to meet Baluchistan's remaining PC-1 target for 1988-1991 of a minimum of 216 nurseries (derived from the planting target of 9,000 acres/9,000,000 trees, to which 20% is added for replacement purposes, divided by 50,000 plants/nursery).

In fact, farmer interest in establishing nurseries is likely to change, based on the experiences of the first series of nurseries. If they are successful, interest will increase, exceeding targets by even greater margins; but if they fail, interest will drop, quite possibly below targets. Hence, observation of the above guidelines on nursery establishment is critically important.

V. SAMPLING

1. Sample

This study is based on interviews with 204 farm households in 10 villages. These households represent a stratified, random sampling of 18 villages, containing approximately 4,087 households, and over 28,000 people.

2. Relevance for Description of Project Clientele

As noted at the beginning of this report, the proportion of large landowners in the initial project activities/studies appears to be greater than in the district as a whole. However, the interest of smaller landowners in planting trees makes a more representative project population easily attainable.

3. Relevance for Nursery and Planting Targets

The fact that the figures on farmer interest in establishing nurseries and planting trees exceed targets by 100's of percent makes the question of sampling error in these figures irrelevant.

4. Data Collection by Provincial Field Staff

Questions regarding the representativeness of this project/study population can be further reduced through the enlargement of the sample by the regular project field staff, using the attached pro-forma.

The key to the use of this pro-forma is to select a random sample. The beat forester can do this following evening prayers at the village mosque, for example, by asking the village men who wants to receive seedlings for planting. The forester can then administer the pro-forma to everyone who replies in the affirmative. This should take no more than 3-5 minutes per person.

PROSPECTIVE PROJECT PARTICIPANT PRO-FORMA

Sheet # _____

Village Name: _____

Tehsil Name: _____

Project Officer Name: _____

Date: _____

1. Name: _____
 Father's Name: _____
 Acreage: _____
 Owner: self _____ landlord: _____
 Trees desired: sp. _____ no. _____ sp. _____ no. _____
 sp. _____ no. _____ sp. _____ no. _____ sp. _____ no. _____
 Desired use of trees: fuel ___ fodder ___ timber ___ market ___
 Other _____
 Desired planting pattern: scattered ___ linear ___ block ___
2. Name: _____
 Father's Name: _____
 Acreage: _____
 Owner: self _____ landlord: _____
 Trees desired: sp. _____ no. _____ sp. _____ no. _____
 sp. _____ no. _____ sp. _____ no. _____ sp. _____ no. _____
 Desired use of trees: fuel ___ fodder ___ timber ___ market ___
 Other _____
 Desired planting pattern: scattered ___ linear ___ block ___
3. Name: _____
 Father's Name: _____
 Acreage: _____
 Owner: self _____ landlord: _____
 Trees desired: sp. _____ no. _____ sp. _____ no. _____
 sp. _____ no. _____ sp. _____ no. _____ sp. _____ no. _____
 Desired use of trees: fuel ___ fodder ___ timber ___ market ___
 Other _____
 Desired planting pattern: scattered ___ linear ___ block ___
4. Name: _____
 Father's Name: _____
 Acreage: _____
 Owner: self _____ landlord: _____
 Trees desired: _____

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Project Reports

REPORT #1 Household-level Factors Affecting Interest in Planting Trees and Operating Nurseries: The Punjab. By Michael R. Dove, 6 May 1987.

REPORT #2 Household-level Factors Affecting Interest in Planting Trees and Operating Nurseries: The NWFP. By Michael R. Dove, 6 June 1987.

REPORT #3 Household-level Factors Affecting Interest in Planting Trees and Operating Nurseries: Baluchistan. By Michael R. Dove, 6 July 1987.