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SUBSTITUTION OF WOOD AND SHRUBS FUELWITH USEFUL FUEL IN FOREST-DEWELLERS IN ILAM PROVINCE OF IRAN.

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Abstract: Today, undoubtedly, forests and range in the world are considered as fundamental economical and social basics the roles of which are so important that their cattle and wood products are the most significant export products. In Iran, because of the close relation between farmers and forest-dwellers and forest and range on the one hand and on the other hand because of the lack of preservatory programs there have always been a destructive trend in ruining these resources. This research was done in Aseman-Abad that is a part of Shirvan and Chardavol city in Ilam province in west of Iran. This area consists of 18 villages and has a population of 14036 people. It is located between eastern longitudes 46°15' and 47°15' and northern latitudes 32°15' and 33°45'.The objective of this study is to examine the way to use potentialities and abilities of the region to prevent and omit the motivations to destroy and trespass natural resources in this country and the betterment of villagers' and nomads' life. Some questionnaires were prepared to measure the rate of consumption in every family and village and to provide practical and accurate programs to solve the problem. By including various questions, the necessary information about unlawful cutting rate will be gained out of which the most tremendous part is for fuel. According to findings, a village with one hundred families needs 15,900 kg wood for fuel which is in addition to the amount used to fix houses, huts, hutches, stables and pens. Existing Potentialities in the Region are: a large volume of organic matter (use of bio gas tools), rural forestry and artificial forestry.

Key words: Substitution, Wood fuel, Useful fuel, Forest-dweller, Iran.

1 INTRODUCTION

Today, undoubtedly, forests and range in the world are considered as fundamental economical and social basics the roles of which are so important that their cattle and wood products are the most significant export products. In Iran, because of the close relation between farmers and forest-dwellers and forest and range on the one hand and on the other hand because of the lack of preservatory programs there have always been a destructive trend in ruining these resources.

So, for a long time, careless cutting of trees in forests and shrubs in ranges to provide fuel has been the most destructive factor, and considering population increase and growing decrease of forest and rangeland areas, this trend is getting more rapid[4]. In order to prevent natural resources ruination and loss, some significant forest preservation projects are being done among which one of the most important ones is the possibility of the replacement of wood and shrub fuel with some suitable fuel for forest-dweller villagers. The objective of this study is to examine the way to use potentialities and abilities of the region to prevent and omit the motivations to destroy and trespass natural resources in this country and the betterment of villagers' and nomads' life. The strategies used are:

1. Changing consumption patterns

2. Replacement with useful fuel

3. Decreasing temperature by improving heating systems

4. Using all abilities and potentialities of the region [2].

This research was done in Aseman-Abad that is a part of Shirvan Chardavol city in Ilam province. This area consists of 18 villages and has a population of 14036 people. It is located between eastern longitudes 46°15' and 47°15' and northern latitudes 32°15' and 33°45'.

2 Research Method

The number of villages was counted by the use of topographical maps and the province villages' map. Some questionnaires were prepared to measure the rate of consumption in every family and village and to provide practical and accurate programs to solve the problem. By including various questions, the necessary information about unlawful cutting rate will be gained out of which the most tremendous part is for fuel.

To scrutinize the situation of fuel used by each family, the questionnaire number 1 was used which included some queries about cooking tools, heating system, the kind of bath system, the amount of wood, shrubs, cattle waste-matter, oil and gas.

To get information about the general situation of the village, the questionnaire number 2 was used which included some questions about the nearness of the village to forest, range and farms, transportation condition, the distance from gas cylinder filling stations, the condition of housing and accommodation of families and also of their immigration and transference, weather conditions in cold seasons of the year, the situation of official and administrative units and finally the situation of water and power sources in the village. In the questionnaire number 3, we can find the information about all families of the village such as the number of tools for baking and cooking, the number and the kinds of heating systems, the number and kinds of baths, the rate of fuel consumption, and finally, existing problems in gathering fuel[4].

Gathering statistics of village families was done as follows:

Table 1- Sampling rate in every village

Number of family In every village	**Sampling rate**
1-50	50
51-100	40
101-200	30
Over 200	20

After getting the questionnaires filled, the inputs related to each village were analyzed by Minitab statistics software.

3 Discussions and Conclusions

The final results of the questionnaires are in the following table (table 2).

Almost 3/4 of the population of developing countries uses woods as the basic source of energy. In spite of that, the amount of wood fuel is so little they are forced to cut trees more than the rate of growth. Lack of forest growth makes a lot of problems and it takes more time for most of the villagers to find wood fuel. Due to non-availability of oil and gas, villagers and forest-dwellers obtain fuel in forests and rangelands. Even in most cities, wood is used when they hold ceremonies, rituals and weddings to heat and to cook. For cooking and baking, they prefer wood to oil and gas because they believe that it adds flavor to bread and food so they insist on using it. The most important factors of destroying forests are some social and economical ones such as cattle overpopulation, cutting young sprouts and old trees to make fuel, turning forest areas to farming areas and deliberate or spontaneous burning.

According to the results of this research the average rate of fuel consumption per capita is 27.5 kg and for each family is 159 kg in Aseman-Abad. Since the rate of annual growth of forest is less than 1 square meter in each hectare and knowing that each square centimeter of oak wood weights between 0.7 to 0.8 gr or oak density is 0.7 or 0.8 gr/cm2[3]. So, every cubic meter of oak wood weighs almost 700 to 800 kg. According to the information above, the annual growth of forests is about 350 to 400 kg per hectare. In other words, a village with one hundred families needs 15,900 kg wood for fuel which is in addition to the amount used to fix houses, huts, hutches, stables and pens. Regarding the mentioned annual growth rate of 350 kg/ha to get such amount we should cut more than 45 hectares of the surrounding forest areas.

Altogether, 385,908 kg of wood is consumed to make energy in 18 villages of Aseman-Abad region which according to converting quotient makes 1,750,478,688 kcal energy and to produce such energy we need 147,595 kg of liquid gas and since each cylinder contains 11 kg of gas, we need 13,418 cylinders or 73,798 small cylinders (2 kg) to replace such energy got from burning wood. To replace it with oil and gas regarding the same converting quotient, we need 197,794 liters of oil or gasoline. In addition, 6162 kg of shrub is consumed and if we consider the energy produced by one kilogram of shrub and wood equal, the energy obtained from this amount of shrub is about 27,950,832 kcal which is equal to 2357 kg of liquid gas that makes 214 cylinders of it, 1178 small cylinders or 3158 liters of oil or gasoline. So, 1,778,429,520 kcal of energy is produced by burning 392,070 kg of wood and shrub annually the replacement of which needs 149,952 kg of liquid gas (13,632 eleven-liter cylinders or 74,976 small cylinders) or 200,952 liters of oil or gasoline.

Table 2- Final results of questionnaires in all villages

Parameters	**Forest area (within and by forest) in rural regions**
Number of families	2427
Population	14036
Annual gas combustion(kg)	1062147
Annual oil combustion(lit)	4552937
Annual wood combustion(kg)	385908
Annual shrub combustion(kg)	6162
Annual animal refuse combustion(kg)	370
Number of gas stoves	2388
Number of oil stoves	1362
Number of wood stoves	60
Number of shrub stoves	0
Number of gas heater	0
Number of oil heater	5202
Number of wood heater	0
Number of shrub heater	0
Number of public bath	0
Number of house bath	2441
Number of public bakeries	14
Number of house bakeries	114

Table3-Amount of produced energy from wood fuel and shrubs and its equivalent according to oil and liquid gas.

Burning matter	**Produced energy kcal**	**Substitution**		**Num. of requirement Gas cylinder(11 kg)**	**Num. of requirement Gas cylinder(2 kg)**
		Oil(lit)	**Liq. Gas(kg)**		
Wood fuel	1750478688	197794	147595	13418	73798
shrub	27950832	3158	2357	214	1178
total	1778429520	200952	149952	13632	74976

Table 4- Share each of villages located in area plan of needs and requirements.

Num.	Kinds of tools / Village name	Num. Family	Gallon 220lit	Cylinder 11kg	Cylinder 2kg	Gas bakery	Public bakery	Transportation machine	Num .of gas stove	Num. of heater	Num. of geyser	Afforestation With popular
1	Gadameh	147	15	22	40	---	Establishment of a public bakery for 3 villages (Poshteh Vamarz, Poshteh kol kol and Myvaleh olia.	A van for all villages.	---	---	22	Fast-grown species plant in areas with suitable Potential.
2	Mohammad goli	209	20	6	40	---			---	---	6	
3	Soltangoli sofla	273	25	---	95	5			---	---	---	
4	Sid nazari olya	175	15	---	28	---			---	---	---	
5	Sid nazari sofla	182	15	---	23	---			---	---	---	
6	Poshteh Vamarz	23	10	24	---	23			11	---	9	
7	Poshteh kol kol	22	10	23	4	21			---	---	8	
8	Myvaleh olia	35	10	35	20	35			8	---	15	
9	Zaman	82	8	---	22	2			---	---	---	
10	Koleh	102	10	---	25	3			---	---	---	
11	Baba moradi sofla	97	10	---	12	---			---	---	---	
12	Soltangholi Olia	155	10	---	20	---			---	---	---	
13	Tahmaseb Olia	28	3	---	7	---			---	---	---	
14	Baba moradi olia	20	3	---	5	---			---	---	---	
15	Ko lkol Olia	335	30	---	42	---			---	---	---	
16	Fatemiyeh	102	10	---	---	2			3	---	---	
17	Jan jan	205	15	5	45	17			12	---	5	
18	Varagah	235	20	7	---	5			7	---	7	
TOTAL		**2427**	**239**	**122**	**458**	**113**			**41**	**---**	**72**	

Table5- Capital and personal costs for establishment of a public bakery

1	**Capital costs(Rials)**	101350000
2	**Personal costs**	21000000
3	**Total**	122350000

The cost of establishment of a site for distributing of gas cylinder with van is around 128000000 Rials.

Table 6- The making cost of one hectare ligniculture plan.

Kind of cost	**Parameters**	**Total price(Rials)**
Steady cost	Enclose with a fence	5600000
Planting cost	Land preparing(plough with tractor)	1500000
	Making hollow	3750000
	Seedling planting	2500000
	Cattle waste matter	3000000
	Seedling buying	5000000
Keeping cost	Removing weeds, replanting, pruning	5250000
Unpredicted cost	5% of total costs above	1330000
Totals		**27930000**

Table 7- Total costs for each villages.

Num.	Name of village	Total costs(Rials)
1	Gadameh	45600000
2	Mohammad goli	19550000
3	Soltangoli sofla	15600000
4	Sid nazariolia	3100000
5	Sid nazari sofla	4090000
6	Poshteh Vamarz	38700000
7	Poshteh kol kol	302945000
8	Myvaleh olia	58525000
9	Zaman	4260000
10	Koleh	5450000
11	Baba moradi sofla	2460000
12	Soltangholi olia	3100000
13	Tahmaseb olia	10100000
14	Baba moradi olia	11500000
15	Ko lkol olia	7860000
16	Fatemiyeh	2800000
17	Jan jan	30225000
18	Varagah	20675000
Total		**313890000**

The doing of this project can make development in villages consume culture of energy. The effects of this project follow as:

1- Conservation of forest and rangeland and decreasing destruction motive in forest and rangeland area.

2- Conservation of soil and water in natural resources area

3- Removing of usual methods in unlogical use of wood fuel and shrubs.

4- Changing of old and traditional patterns of fuel uses.

5- Attracting of active participation of people in conservation, recovery and developing natural resources.

6- Making of employment in poor villages in form steady and temporary.

7- Economical improvement in tribal and rural area and increasing of production yield in natural resources.

8- The close cooperation between governmental organizations related to villages.

9- Developing of social justice in poor area of country.

4 Problems of Supplying Energy

1. Lack of oil and gas.

2. Preciousness of oil and gas since oil is bought for 210 to 230 Rials per liter and one 11-kg cylinder is bought 7000 to 8000 Rials and each small cylinder costs 2500 to 3500 Rials and regarding the distance from oil distribution centers this price is various in different regions.

3. Lack of useful and punctual distribution of fuel, especially that of gas which makes families use wood and shrub.

4. The distance from fuel distribution centers in some villages.

5. Low financial situation of villagers to buy 1000 - 2000 liter tanks to store oil so that their storage is quickly finished and in cold season they face lack of oil.

Existing potentialities in the region and using them in programming:

1. Because of existence of a large volume of organic and dissolvable materials, the use of biogas system is possible.

2. Making artificial and afforestation with fast-growing species around seasonal rivers of villages, farms and so on.

3. Another valuable potentiality of the region is its rural forestry.

5 Suggestions

Since three villages Poshte Kol-Kol, Poshte Vamarz and Mayvaleh Olia have useless roads for transportation, the rate of wood fuel consumption is high so that they use ten times more than other villages so the view of it should be different:

1. Making a bakery in these regions which they lack now.
2. Another program is to make a unit to distribute fuel especially liquid gas in three above mentioned villages which are distant from the center of the rural district and the location of the unit should be in the middle village of Poshte Vamarz.
3. Due to the preciousness of fossil fuels especially liquid gas it is suggested that it should be distributed cheaply.

We should know that paying attention to these deprived and bereaved regions should be more than normal regions and the attempt to solve their problems should be inclusive and continuous. Since trees are very important especially in rural areas we should try to support their preservation. Replacement of wood and shrub fuel with useful fuel provides the necessary conditions of stable development of villages and makes it possible to hand these blessings down to next generations.

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