
Illegal Plant Genetic Resource Trafficking in the Border Villages of Kafta Humera Wereda, Tigray Regional State, Ethiopia

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Abstract: A survey to identify illegal plant genetic resource trafficking was made from February 2017 to March 2017 in *Kafta Humera wereda*, Tigray regional state, northern Ethiopia. Semi- structured interviews, structured questionnaires; focus group discussion and document analysis were used for data collection. A total of seventy one informants from local security, local community federal policies and custom and revenue officers were interviewed. Snowball sampling was used to select the local community and local security while the rest informant was purposely selected. Microsoft excel spreadsheet and Spss version 20 was used to analyze data. The Leave of *Rhamnus prinoides* together with its fruits, and fruits of *Adansonia digitata* are the frequently exported plant and plant derivatives through illegal route. These plant biogenetic resources are exported to Sudan and Eritrea both by illegally and legally coverage. The awareness of the informants participated in the interview on illegal biogenetic resource trafficking varies from site to site and from sector to sector. The main illegal route whereby illegal traffickers use to export plant and plant derivative are *Maytselot*, *Menkerker*, *Awezruf*, *endaaboy Tewelde garden* and *Haji Abdugarden*. Most of the traffickers are unemployed youth that live in and around the border. The existing gap in community awareness needs awareness raising and alternative job opportunities creations. The link between different stakeholders also needs solidarity to accomplish consistent controlling mechanism.

Keywords: Illegal Route, Trafficker, Biogenetic, Kafta Humera, *Rhamnus prinoides*

1. Introduction

Forest genetic resources/ FGR/ offer major opportunities for people to cope with important challenges such as climate change and the increasing demand for food, energy, wood products and environmental services [1]. To achieve their value fully, countries and their citizens require political dedication, effective institutions and relevant policies and legislation in order to respond to imperative and increasingly varied needs in conservation and FGR management [2].

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) saves from harm many species of animals and plants to guarantee that legal and illegal commercial demand does not threaten their endurance in the wild. Ethiopia is a country that signed an international convention on biological diversity [3]. More ever, Ethiopia has taken a number of basic measures on biodiversity conservation

and promotion of sustainable utilization, including putting in place domestic legislations and promotion the former Plant Genetic Resources Centre to Ethiopian Biodiversity Institute so that it can deal with plant and other bio genetic resources [2]. Awareness building at all levels is a key prerequisite for mobilizing popular support and international cooperation to advance the conservation and reducing illegal trafficking status of forest genetic resource and their derivatives [1].

The most important threats to forest genetic resource are Forest change and expansion of crop land, Demand for energy, flawed harvesting and use, Livestock and browse animals, Climate change, Invasive species and illegal trafficking of the genetic resource [2]. Plant illegal genetic resource trafficking is the movement export and import of plants and/or their derivatives for various methods without legal permits. This practice is highly common in the propinquity of national parks, conservation sites and borders.

Although plant genetic resource conservation laws and regulations provide a variety of enforcement mechanisms to control the illicit plant genetic resource trade, implement mechanisms pose a huge challenge. Inadequate financial, human resources and lack of institutional capacity are barriers to enforcing these plant genetic resource laws [4].

There are several stakeholders (institutions, researchers, policy makers and public) working on biodiversity conservation and sustainable utilization. More over, further strengthening of coordination of the stakeholders are required for the effective conservation and sustainable utilization of biodiversity and ecosystems [2]. Therefore, this study was needed to survey the type, amount, route of plant genetic resource trafficking and develop stakeholder based control and benefit sharing for illegal plant genetic resource trafficking through Ethio-Sudan border,

in the northern part of Ethiopia.

2. Material and Methods

2.1. Description of the Study Area

The study was conducted in *kafta Humera wereda*, Tigray regional states of Ethiopia, which, bordered by Sudan and Eritrea externally as indicated in

Figure 1 below. *kafta Humera* wereda surrounds *Setit Humera*, capital city of Western Tigray Zone, *kafta Humera* and *Setit Humera Weredas*, in all sides. People in the study area lead their life by a mixed farming system (animal husbandry and crop farming).



Figure 1. Map of Ethiopia indicating the study site.

2.2. Research Design and Methodology

A field survey was conducted from February to March 2017 in the selected border of *Kafta Humera* wereda, Tigray Regional States, Ethiopia. Data were collected on the status, route, ways of illegal trafficking and suggested management options of banned movement of plant genetic resources from concern offices based on the information obtain from the corresponding sector the wereda Administration. Accordingly, government sectors from the selected district offices were purposively selected based on their proximity to the issues under study. A total of 71 informants from various sectors were selected using a snowball sampling method [5] and purposive sampling methods based on their professional background and position towards the matter. These sectors include custom and revenue officers, local security, community resident and federal police officers.

The number of respondents was determined based on their availability number they were and consideration of budget and time. All informants were subjected to semi structured questioners design beforehand. In addition, semi-structured

interview, focus group discussion and document analysis were used to exploit the remaining information on the illegal movement of plant genetic resources across the entire study wereda. Data was analyzed using SPSS software package version 20 to obtain simple descriptive statistics like frequency and percentage. More ever, Microsoft excel software was used to sketch charts such as bar graph and pie charts.

3. Result

3.1. Background Information on Informants

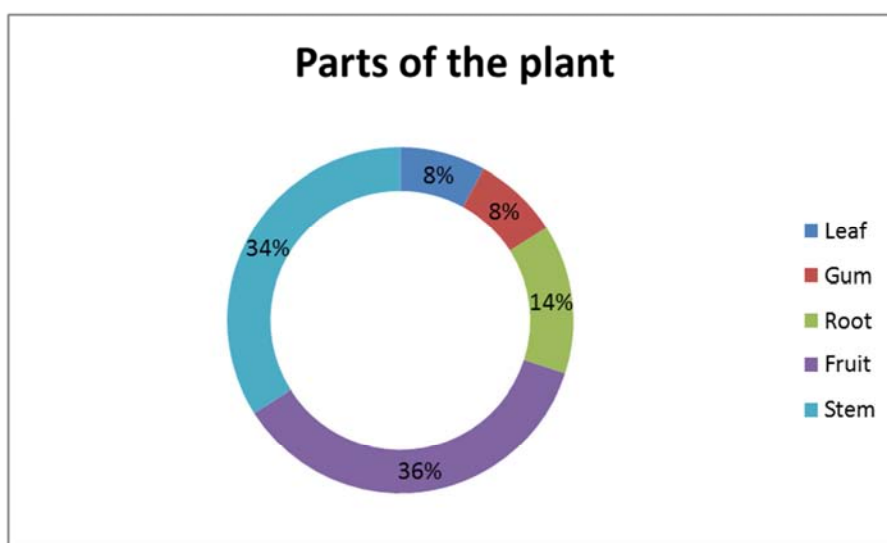
The number and type of informant included to participate in this research was depending on the real situation of the area under study. Accordingly, 30% from custom and federal police officers, 42% from local security and 28% were from local community members (table 1). Besides, 47% of them were primary school completes (1-8) and 97% of the respondents were male. Most of the participant was in the average age interval of above forty.

Table 1. Informants profile and their site.

Sites	No of sample taken			Age interval			Gender		Educational level			
	Custom & Federal polices	Local Security	Local community	20-30	31-40	>40	M	F	Illiterate	Primary (1-8)	Secondary (9-12)	Tertiary
Bereket	-	11	6	-	2	15	17	-	4	13	-	-
Dima	9	8	14	12	11	8	29	2	2	11	15	3
Lugdi	12	11	-	8	8	7	23	-	3	9	8	3
Total	21	30	20	20	21	30	69	2	9	33	23	6

3.2. Parts of Plant Trafficked from Ethiopia

The result of the study reveals that 38% of most frequently trafficked plant parts were fruit, 31% stem, 15% root and 8% both gum and leaf parts (figure 2).

**Figure 2.** Parts of a plant trafficked from Ethiopia in percent.

3.3. Type of Plant and Their Derivatives Trafficking

The type of plant and plant derivatives most frequently trafficking through Ethio-Sudan border to Sudan were *Rhamnus prinoides*, *Adansonia didgitata*. *Rhamnus prinoides*

trafficked its leaves and fruits together for the purpose of local drink or beverage ingredient in Eritrea. The remaining illegally trafficking plant and plant derivatives are used for medicinal, fumigation and food (Table 2).

Table 2. Type of plant and plant derivatives trafficking through the Ethio-Sudan border.

No	Botanical name	Local name	Parts used	Use value	Smuggled to country
1	<i>Dalbergia melanoxylon</i>	Zibe	Stem	Houseconstruction, factory product	Sudan
2	<i>Anogeissus leiocarpa</i>	Hanse	Stem	House construction	Sudan
3	<i>Rhamnus prinoides</i>	Gesho	Fruit, leave	Local beverage	Eritrea
4	<i>Boswellia papyrifera</i>	Etan	Gum	Fragrance	Sudan
5	<i>Adansonia didgitata</i>	Dima	Fruit	For food	Sudan
6	<i>Balanites aegyptiacus</i>	Mekie	Fruit	Produce oil food	Sudan
7	<i>Securidaca longepedunculata</i>	Shitora	Stem	Medicinal	Sudan
8	<i>Acacia seyal</i>	Tsaedachea	Root	Fumigation/tush	Sudan
9	<i>Plumbago zeylanica</i>	Aftuh	Root	Medicinal	Sudan
10	<i>Terminalia brownie</i>	Weiba	Stem	Fragrance	Sudan
11	<i>Ziziphus spina-christi</i>	Gaba	Fruit	oil product, Food	Sudan
12	<i>Tamarindus indica</i>	Humer	Fruit	Food	Sudan

3.4. Awareness of Participants on Illegally Plant Resource Trafficking

Based on the opinion of the informants the responsible actors for controlling illegal movement of plant genetic resources were community, administrative body, security

force, and custom and revenue department.

3.4.1. Community

In the entire interviewed residents in the study area near to the checkpoint, there were community members that know illegal biogenetic resource trafficking in general. However,

they were not committed to control it despite of their familiarity with it. Moreover, the illegal traffickers were living together with the community doing so without any challenge from the society. The highest frequency of the local community's gap on controlling illegal biogenetic resource

trafficking is due to lack of prior knowledge of access permit as statistically proofed in the frequency table 3 below. This includes, they lack what to access and who can give a permission to smuggle plant resource.

Table 3. Awareness of the local community on genetic resource access permit?

Sites	Description	Frequency	Percent	Valid percent	Cumulative percent
Lugudi	Valid	Had prior Knowledge on access permit	4	36.4	36.4
		Noprior Knowledge on access permit	7	63.6	100.0
Dima	Valid	Had Prior knowledge of access permit	1	7.1	7.1
		No Prior knowledge of access permit	13	92.9	100.0
Bereket	Valid	Had Prior knowledge of access permit	3	50.0	50.0
		No Prior knowledge of access permit	3	50.0	100.0

3.4.2. Checkpoint

A member of checkpoint staff in the study site performs all duties given from the Ethiopian government like other check point cites together with other stakeholders. They were also trying to control the illegal trafficking through regular checking. Even though the community lacks commitment to control the illegal trafficking, members of check point (federal police) accomplish all activates by them. This could lack consistency in addressing the proclamation of concerning illegal plant genetic resource trafficking despite of their commitment.

3.4.3. Revenue and Customs Authority

The custom checkpoint administration addresses the illicit plant genetic resource trade through regular checks by assigning from the members of the federal police.

Members of the revenue and custom authority officers were also always in place to make their entire mandate required from them. Regarding the illegal trafficking they made a patrol method of checkouts

3.4.4. Local Security

The members of the local security surprisingly administer

and enforce the law despite the fact that their membership of the society members. They establish a check point cite when the time and condition needs to do so. Their method of controlling was very admirable in enhancing the activities. However, they have many difficulties that should solve by society, governmental body and other stakeholders.

The main factor in the least implementation of illegal plant genetic resource were not a single issue that causes, rather it was the cumulative effect of low enforcement, least knowledge on legal framework, lack of training on proclamation and CITES and so on. Regarding the law enforcement practice, 72% of the interviewed informant confirms, it was not sufficient enough to cope the existing problem while 28% of them said it is sufficient enough. Besides, the highest number of informants didn't know the existence of the illegal local hidden market that illegal traffickers export through it. Informants in the study area didn't have prior knowledge on proclamation of plant genetic resource trafficking. In addition to that, they didn't take any training on conservation of endangered and threatened species (figure 3)

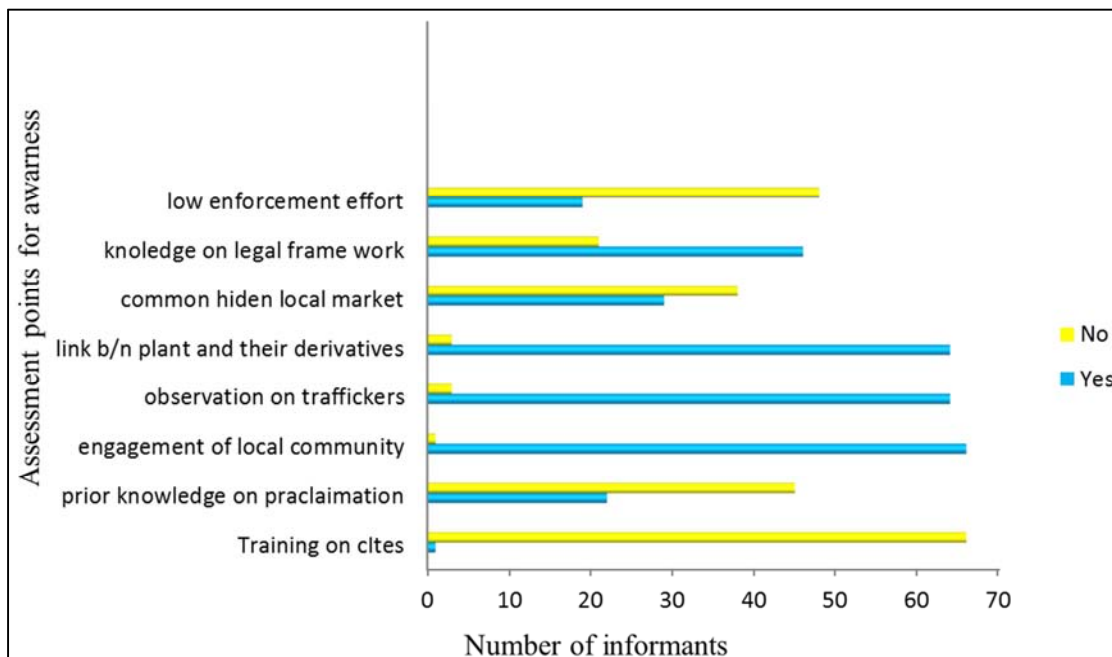


Figure 3. Assessment of informants' awareness on plant resource trafficking.

3.5. Smugglers of Illegal Plant Genetic Resource Trafficking and Access

The Community members that involved in illegal plant genetic resources trafficking were Farmers, unemployed youths, local brokers even the citizens in the neighboring states.

Unemployed youth:

The number of unemployed youth in check point near area and surroundings were very huge. These unemployed youth had, not only from the surrounding areas, but also from various localities of Ethiopia. The reason why they come to this area was not well known. However, most probably the local communities' deduce they were coming for the purpose of illegal trafficking of biogenetic resource and other goods. The existence of such a large number of unemployed youth had a devastating effect for illegal biogenetic resource trafficking. The local security and member of the Dima check point confirms what the local communities had said. Besides, the researcher's observation on the illegal exit point found true. They were all youths which didn't have another alternative job to lead their life.

Farmers; the community in the boarder sides of *kaftahumera* and surrounding area lead their life by mixed farming system (crop farming and animal husbandry). There

were also communities that lead their life by selling and buying common goods in a small scale. Concerning the illegal biogenetic resource, particularly the plant role, there were farmers that act as co- traffickers, direct ways and seasons for doing trafficking activities as the local security and check point member informed during the interview. The illegal traffickers cooperate with farmers in order to smuggle themselves from security bodies. Therefore, the farmers in the study sites were not in a required position to struggle the illegal biogenetic resource that carried out in their surrounding area.

Investors; There were different types of investors in the boarder of the study wereda. To list some of them; cereal farming investors, animal fattening investors, importers and exporters of goods. These investors were not all absolute in struggling the illegal plant genetic resource. There were investors that exports unpermitted goods, biological resources together with the legal one by cheating the legal routes. This was from the experience of local security and other legal concerned bodies and the researcher observation. Therefore biogenetic resource trafficking were not that much a single line that perform by a single person, group or community rather it was a complex Phenomena remain difficult to control completely in the study area.



Figure 4. Illegal traffickers with their traditional boat on Eritrea and Sudan side.



Figure 5. The local security on their checkpoint site near humera.

3.6. Entry and Exit Point of Illegal Biogenetic Resource Trafficking

There were about 22 routes listed with their Gps coordination by which biogenetic resources were trafficked to another country from Ethiopia both legally and illegally (Table 4). These routes are reduced to the nearest three

main checkpoint routes for reporting purposes in Table 1 above. Those were Dima, Bereket and Lugudi check points. The main illegal route whereby most illegal traffickers use to export plant and plant derivative were *Maytselot*, *Menkerker*, *Awezruf*, *endaaboy Tewelde jerdin* and *haji abdu jerdin*.

Table 4. GPS Points in Kafta Humera Wereda Exit Rout Genetic Resource/GR Trafficking.

S/N	Gps coordination		Altitude	Tabia	Specific Place	Type of biogenetic resource exported
	Eastings	Northing				
1	0237143	1578942	556	Rawyan	Abyi menqerqer	<i>Teff</i>
2	0237268	1579277	564	Rawyan	Meragefi at Abyi menqerqer	Station of Traffickers where they exchange GR
3	0237363	1578256	533	Rawyan	Maytselot	<i>teff</i> , <i>Rhamnus prinoides</i> , resin, honey
4	0236823	1577387	544	Rawyan	Zban mdmar Tekeze-rawyan	Tekeze & Rawyan rivers combined
5	0236757	1577643	557	Rawyan	Shwshwit	Traffickers pass to Sudan-Eritrea border
6	0236271	1577125	559	Rawyan	Azruf	<i>Adansonia didgitata</i> , animals, crops, <i>Rhamnus prinoides</i> and drugs pass to Hamdait (Sudan)
7	0237217	1557215	666	Mycadra	Mycadra town	passageway and destination of Traffickers
8	0216976	1547724	627	Mycadra	Lgudi Check point	people and materials are passed legally through Road transport
9	0233859	1538046	675	Mycadra	Enda Shumye Gebru Cotton farm	Traffickers pass through it to Mechach & bahreselam then to sudan
10	0230795	1523666	641	Mycadra	near enda weyane cambo no 1	Banat, Traffickers pass through it to Mechach & bahreselam then to sudan
11	0224537	1524546	548	Mycadra	Bahreselam river	An Exit route to Abderafie then to Sudan, where taf, animals and <i>Dalbergia melanoxylon</i> are trafficked
12	0216883	1532022	604	Mycadra	Enda Guesh/Afera cambo	An Exit route in land to Sudan, near to Awetir of Amhara-sudan border
13	0210433	1533783	579	Mycadra	A forestat Mechach	animals, <i>Teff</i> , <i>Dalbergia melanoxylon</i>
14	0210746	1536756	609	Mycadra	Enda Tsegay Grmay cambo	animals and crops
15	0211162	1539793	595	Mycadra	Near Beshr Cambo	animals, crops, charcoal and construction woods
16	0216025	1533687	629	Mycadra	Last point for the Lgudi area to Redem	An Exit route for Genetic Resources and other materials
17	0238271	1545948	678	Mycadra	Bewal area	traffickers from maycadra, Sheglil, Baeker and Lugudi passed through it, to Border areas
18	0223422	1549872	684	Mycadra	Jemam	Kunama ethnic, known to utilize wild forest fruit like <i>Adansonia didgitata</i> , <i>Tamarindus indica</i> etc
19	0227325	1565985	598	Bereket	Bereket town	A town where Center of traffickers
20	0224182	1575113	596	Bereket	endabo haji	Common Exit route for <i>Teff</i> and goods
21	0218647	1575172	571	Bereket	Endagaba exite route	Common Exit route for animals
22	0224619	1574705	542	Bereket	Endaboy Tewelde	animals, <i>Teff</i> , coffee and vegetables & fruits

4. Discussion

The way of trafficking *Rhamnus prinoides* from Ethiopia to Eritrea was by using Sudan border and then redirect to Eritrea before it enters to the mainland of Sudan through illegal traffickers of both Eritrea and Sudan. Regarding *Adansonia didgitata*, its fresh fruit were trafficked for the purpose of domestic consumption because of edible nature it has. According to [6] various parts of *Adansoniadigitata* (leaves bark and seeds) were used as a panacea, that is, used to treat almost any disease. *Dalbergia melanoxylon* (African black wood) was the type of plant in the western and northwestern zone of Tigray which highly threatens by domestic user and illegal traffickers. It was illegally trafficked for factory product and construction purpose due to its hard stem part in nature. In Tanzania increasing harvesting of *Dalbergia melanoxylon* for commercial timber, forest clearing for new settlements and agriculture,

frequently occurring bushfires, low regenerative ability of the species by natural methods and lack of the national conservation efforts presents a serious threat to the future availability [7].

The root of *Acacia seyal* was trafficked for the purpose of fumigation. Married female in Sudan mostly (50%) uses *Acacia seyal* for *Dokhan* (smoke) [8]. *Dokhan* is a traditional Sudanese smoke in which woman wraps her entire body in a blanket and sits on a hole in the ground. The use of root part for fumigation and other purpose cause the plant in a severe threat. Ethiopia had no legal export and import of products for medicinal use but plants of medicinal importance were exported to Djibouti and other countries as agricultural products [9].

The 1997 IUCN Red List gives threatened Plants by International trade in Kenya through smuggling and this might soon pose a threat to Ethiopia if appropriate control methods and propagation are not timely put in place [10].

Based on this result, the highest plant part from the most

frequently trafficked from Ethiopia was the fruit part. This could have lost of the patent use on biodiversity resource in the case of endemic, indigenous and rare plants in Ethiopia [11]. Besides, the use of more leaf part repeatedly causes deforestation on the plant genetic resource. The high treat to the destruction of mother plant move toward with root, bark and leafy – stem harvest [12], [13], [14], [15].

The major plant and plant derivatives resource illegally imported to Ethiopia was not that much bulk as compared to the illegally exported. Only one type of plant was repeatedly entered by trans boundary travelers through the *Lugudi* check point for the purpose of shading. The local people call it “*Sundance’s tree*”. Morphologically, it had rapid growth and better quality of the canopy for shading in the dry season of the area. However, there was a considerable amount of goods trafficked from Sudan to Ethiopia through the illegal entry places adjacent to the three checkpoint areas. These include powdered detergents, clothes, electronics (such as television, radio, dish, and receiver), shoes, belts and watches. Illegal traffickers collect a plant resources from a cultivated area, protected area and national parks particularly from the nearby national park, *kafta sheraro*.

Illegal trafficking in plants, their parts and derivatives were a worldwide phenomenon that has severe implications for biodiversity, ecosystems and national economies. It also threatens sustainable conservation of biodiversity which is driving many species towards extinction [16]. Much of this trade is from developing countries, which contain most of the world's biodiversity, to developed ones, which supply the demand. The trade is demand driven targeting rare, protected and highly endangered species of wildlife and is driving many species to the threshold of extinction. This demand and price for wildlife products in the illegitimate market persists to drive poaching. Most knock species on commercial scale, indigenous tree species for timber and charcoal. This leads to environmental degradation with adverse effects such as climate change, global warming and water scarcity.

In an effort to combat these conservation challenges and enhance plant security, the Government of Ethiopia through the Ethiopian biodiversity institute (EBI) and other agencies has taken various policy, legislative and operational measures. EBI is actively collaborating with the local communities neighboring the National Parks and Reserves and has also been working closely with other law enforcement agencies within Ethiopia, regionally and internationally to ensure that the illegal trafficking of wildlife species and their products is curbed by recruiting professional experts at the exit routes.

5. Conclusion

Assessment of these illegally trafficked plants resource are essential from the perspective of conservation and sustainable use of plants, which consequently helps in formulation of potential raw materials in modern industry of pharmaceutical and other ornamental use values for further availability and utilization of humanbeing.

In Kafta humera, unemployed youth and people with low daily income of the local community collect plants from the different sources and then trafficked in order to complement their daily incomes. Due to unemployment and lack of knowledge of proclamation increasing market demand, numerous plant species were threatened with extinction. For rational and regulated collection and use, local community control measures are necessary. It is also essential to promote the cultivation of these plants frequently trafficked plants that would provide strong implicate for conservation. The existing gap in community responsiveness needs awareness raising and alternative job opportunity creations of the unemployed community members.

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