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Cause of Land Degradation and Rehabilitation Practices in Case of Amba Sidist Western Ethiopia

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ABSTRACT

In Ethiopia, land degradation has become a serious problem affecting all spheres of social, economic and political life of the population. It is one of the major challenges to agricultural development and food security of the country. In order to solve the problem of land degradation, a lot of efforts have been made since 1970s. However, at the end the intervention couldn't be sustainable and able to bring the intended impact. Thus, identification of challenges in relation to land rehabilitation practices is of paramount importance. The study was undertaken in Amba 6 kebele. In order to achieve the objective of the study, both primary and secondary data were generated by employing qualitative and quantitative data. Stratified sampling technique was used to select 76 household heads were selected from on Amba 6 by using stratified random sampling as it is believed that the households are similar with respect to the characteristics that influence the research output. The process of analysis of the study was carried out using qualitative description and quantitative analysis. The quantitative data was analyzed using frequency, percentage and mean when appropriate. The qualitative data was discussed to substantiate the study. The findings of the study indicated that decrease in productivity of farm land, involvement in off-farm activities, increase in size of human population, lack of full cooperation of family members to involve in land rehabilitation practices, low assistance gained from neighbor-hoods, less access to extension service and inadequate attention from woreda Agriculture and Rural Development office are the major challenges encountering the implementation of land rehabilitation practices in effective way.

INTRODUCTION

The twenty-first century is a time by which the world is getting seriously confronted by issues of sustainable use of natural resources. Despite the emerging recognition of their decisiveness for the survival of humanity on the planet, these days, water and land ecosystems are being degraded at an alarming rate (Hannam, 2003 cited in Teketel, 2009). The case is worse in developing regions, where the majority of the population depends on these resources for its livelihood. Hence, the conservation and management of land and water resources for sustainable intensification and agriculture and poverty reduction in developing regions has remained one of the most challenging policy issues for a long time (Bekele et al., 2007). The three inherently interrelated and interdependent land resources, namely, soil, water, and vegetation are in the immediate focus of most local, regional, and international policies, programs, initiatives, covenants, protocols, and conferences that are meant to pave the way to sustainable development. Land is the most important natural resource all over the world. It is a place from which human beings are exploiting a number of resources (Taffa, 2002). Almost all food production for the world population is derived from land, and the need to produce more is increasing from time to time due to an increase in population. For increasing production, either area under cultivation must be expanded or its productivity needs to be increased. Thus, fertility of land is decisive factor in addition to other technological input. However, land is losing its productivity due to a rising

trend of land degradation (Woldeamlak, 2003). Land resources degradation, resulting from different causes, is threatening long-term productivity. Nowadays, land degradation is reducing yield significantly and it is more acute in some parts of the world than the others. For example in Central America, 75% of cropland is seriously degraded while in Africa, 20% of the total land area is at risk of Unrecovered (Sida, 2007). In Ethiopia, land degradation has become a serious problem affecting all spheres of social, economic and political life of the population. It is one of the major challenges to agricultural development and food security of the country. The rate of the country's land degradation is very high.

On the other hand, like many other developing countries, Ethiopia is characterized by agrarian economy and about 84 % of its total population derives means of survival from agricultural activities. Moreover, the role of agriculture in the overall economy is quite significant. It contributes 50% of the total GDP and 85% of foreign exchange earnings. Thus, land productivity is one of the key elements for enhancing economic development of the country. In contrast, the level of land degradation has already reached an alarming stage (MoARD/WB, 2007 cited in Desta, 2009:2). This land degradation has been recognized to be one of the chronic problems in Ethiopia and many efforts have been made against it. However, the problem of land degradation is continuing and natural resource base is deteriorating at alarming rate (Yohannes, 1999; Genene, 2006). The major causes of land degradation in Ethiopian highlands include

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cultivation on steep slopes, deforestation, and erosive rainfall pattern, lack of fallowing, overgrazing and lack of proper conservation measures. The underlying factor for the degradation of land is population pressure (Lakew et al., 2000). In response to heavy land degradation in the country, large-scale efforts for implementing natural resources conservation programs had taken place starting from the recent past.

Statement of the problem

In Ethiopia, the heavy dependence of people's livelihoods on agriculture and inappropriate use of natural resources resulted in fast and vast land degradation (Genene, 2006). On the other hand, development of agricultural sector partly depends on land productivity. However, this resource is seriously threatened by land degradation and aggravates the food insecurity problems in the country through its adverse impact on crop yield. The country could not feed its population at present and it will have difficulties doing in the near future partly due to serious land degradation (Kruger et al., 1997; Genene, 2006). To solve the problems of land degradation in the country, many efforts have been made since 1970s. A large number of soil and water conservation activities were implemented in different parts of the Ethiopian highlands in the 1970s and 1980 with a huge resource obtained from international community, particularly World Food Program (WFP).

Objective of the study

The general objective of the study

- To assess the major cause and effect of land degradation and rehabilitation practices in case of Amba 6 kebele.

The specific objectives

- To identify major causes of land degradation in the study area
- To identify the social, economic and institutional factors that determines the practice of land rehabilitation
- To assess major challenges and shortcomings in undertaking different land rehabilitation practices

Research Questions

Based on the above specific objectives, the research attempted to answer the following question:

1. What are the main causes of land degradation in the study area?
2. What are the ongoing practices of land rehabilitation?
3. What are the main socio-economic and institutional factors that affect the practice of land rehabilitation?

MATERIALS AND METHODS

Sampling design

The researcher was adopted stratified random sampling methods to select the household this stratification method would be selected based on wealth status. The users of farming land were stratified into rich, poor and medium

household head. This is because rich, poor and medium could have different attitude and perception towards effect of economic and environmental degradation this is to give equal chance for the whole target population to be selected as a respondent.

Sampling techniques

The study area will be selected because of the existence of land degradation caused by high population growth. From the total of 319 households in the study area, 76 (7%) will be selected from the total. But, due to deficit of resources the interview HH number is declined to 10 HH. This extent of households was selected using stratified random sampling techniques. Therefore, to find out representative sample for this study the researcher used the following Yamane simple determination formula.

$$n = \frac{N}{1 + N(e)^2} \text{ (Yamane, 1967)}$$

Where n=sample required as a representative, N=sum of households of, e=precision level assumed to be (0.1 or 10%), $n = 319 / 1 + 319(0.1)^2$, $n = 76$ HH

Source and types of data

Both primary and secondary data were used in the study. The primary data were collected from the selected respondents and secondary data were collected from different written materials such as previous research, published and unpublished documents in the library. Also, quantitative and qualitative data are will be used in this research this data were collected from respondents.

Method of data collection

Both primary and secondary data collected were used. Primary data was collected by using: Questionnaire; These questionnaires will prepare for 10 respondents. Observation in this case structured and unstructured were used as different techniques of observation. We conducted interview to identify people's experience, perception, value and opinion about the cause of deforestation, contribution and significance of forest for their living.

Data analysis

The collected data was by analyzed using descriptive statistics technique with Statistically Package for Social Scientists (SPSS) software to analysis data drawn house hold survey, descriptive statics like percentage, frequency, distribution was used to analyzed the data. This technique of data analysis was applied to show the number of respondents that involves in questionnaires; interview and percentage was also be used to depict responses of the sample respondent and to place them per hundred portions respectively.

RESULTS AND DISCUSSION

Sample Household Characteristics

A total of 30 respondents were used for this study. The Households were taken purposely for data collection. Out of the total of 30 respondents, 60% (n=18) of them

were males and the remaining 40% (n=12) were females. With regards to educational status, out of the total of 20 respondents, 36.67% (n=11) of them were illiterate, 20% (n=9) were they can read and write, 23.3% (n=7) were primary school and 10% (n=3) were secondary school. As indicated in table 1; 56.67% (n=17) of the respondents were married, 23.33% (n=7) were divorced, the remaining 13.33% (n=4) of them widowed, and 6.67% (n=2) of the respondents were single.

As indicated in table 2, 43.34% (n=13) were in the age group of 60 and above year followed by those in the age of group of 31-45 year 33.33% (n=10). The remaining 23.33% (n=7) of the respondents were found in the age group of 15-30 year.

Table 1: Marital status of sample Household.

Marital status	Frequency	Percent
Married	17	56.67
Divorcees	7	23.33
Widows	4	13.33
Single	2	6.67

Source: Field Survey 2008

Table 2: Age Distribution of the sample Household

Age of the Household head	Frequency	Percent
15-30	7	23.33
31-45	10	33.33
46-60	13	43.34

Source: Field Survey 2008

Communities Perceptions about land degradation in the Study Area

According to local source, forest used to support the livelihood of most rural communities the farmers used to get different functions and services from the forest; Such as fire wood, herbal medicine, bee keeping, house construction materials, food, etc. However, increase land degradation in the study area was indicated as indicators of decrease in functions and services of lands. One of the community leaders said that the last few decades' forests were depleted and even currently the local communities supplying forest products in the market as income generation.

According to the interviewee, in the study area, the local communities had no access being gained awareness creation regarding how land degradation rehabilitation mechanisms on sustainable manner. The local communities were being applied only their traditional knowledge for forests resource conservation rather than integrating their knowledge with scientific way which was being important to ensure environmental sustainability. From that local community one of the farmers also said that expanding of infrastructures for the sake of attaining erosion was being created key roles for easily occurrence of land degradation in the study area. Issues which were noted earlier were some of the key factors which aggravated land degradation.

According to the interviews, before two decades, land degradation was not a serious issue in the study area, but currently the problem was not only a serious issue rather

Table 3: Current Land Status in the Study Area.

Current Land Condition	Frequency	Percent
Excellent	2	6
Good	6	20
Moderate	9	30
Degraded	8	33
Very much degraded	3	7
Total	30	6

Source: Field Survey, 2008

Table 4: Major causes of land degradation in the study area

Causes of land degradation	Frequency	Percentage
Overgrazing	17	56.67
Deforestation	7	23.33
Mismanagement of resources	4	13.33
Population growth	2	6.67
Total.	30	100

Source own survey 2008

than, it was a question of survival.

Major Cause of land degradation in the Study Area

According to local community, the major cause's land degradation in the study area overgrazing, deforestation, population growth, mismanagement of resources. Out of the total 30 respondents, 56.67% (n=17) of them agreed that deforestation as the major causes of land degradation, the remaining was for other reasons 23.33% (n=7), overgrazing 13.33% (n=4), and 6.67% (n=2) other services.

Overgrazing

Out of the total respondents, 56.67% (n=17) of them agreed that overgrazing as a cause of land degradation. Like; teff, maize, etc were some of cereals important to generate income for local communities. The majority of local community in the study area mainly dependent on agriculture. Farmers in the study area pursue mixed agriculture. Both crop farming and rearing of livestock. One of the key farmer said that the reason why expansion of agriculture is due to immediate solution rather long term that means, products being obtained from agriculture takes short period of time and also it is possible to generate income in short period of time than forests which takes long period to get its outputs and also it takes long period of time to get income from it.

Deforestation

Out of the total respondents, 23.33% (n=7) of them showed that fuel deforestation as the major factor of land degradation in the study area. According to the respondents, in the study area forest was the common and major household energy source for home based activities (food cooking, water heating, etc). Because of the lack of modern electric energy supply, the majority of the households are depending on fuel wood. As information obtained from the sampled households, fuel wood consumption was very exhaustive, time consuming, however, they use it as main energy source because of lack of options to use another improved energy sources

Mismanagement of resources

Out of the total of 30 respondents, 13.33% (n=4) of them agreed on urban development's as major cause of land degradation. According to their opinions, various activities took place on the area, which replaced the area the resource was depleted. As a result, various constructions and infrastructures were built. Like expansions of different building of schools, clinic, cultural offices, etc, were some of the infrastructures built on the area to expand urbanization.

In the study area mismanagement of resources was being played major cause for contribution of land degradation. and to expand infrastructures huge hectares of land was being depleted in the study area

Population Growth

According to the local community due to population growth in the study area increased demand for more agricultural land, timber production, fuel wood consumption and other uses, at his time the tree cover was reduced, so the stock of trees diminishes as the forest resource was overly exploited rather than being managed on a sustainable basis. The local farmers, also perceived that over exploitation of forests resource in the study area led to land degradation and the diversion of animal dung from its traditional role as soil nutrient to direct burning for fuel, while the reduced dunging of the land and soil erosion caused by trees cover clearance or succeeded deforestation, further impairs soil fertility, this in turn, promote water runoff which takes soil from the land to produce sediment in rivers, polluting drinking water supplies, loss of productivity and aggravate formation of gullies, soil erosion and floods.

Major Consequences of land degradation in the Study Area

The causes and consequences of land degradation were interlinked with each other's, that means if there was causes it also consequences and vice versa. According to most respondents the major consequences of land degradation in the area are poverty, climate change, and gully expansion,

In the table 6, 63.33% (n=19) of the respondents agreed that poverty as consequences of land degradation, 26.67% (n=8) as climate change, and 10% (n=3) of the respondents said gully expansion also as a consequence of land degradation in the study area

Poverty

Poverty was the major consequences of land degradation in the study area. s to be degraded; as a result reduction in productivity was being employed for their livelihood. the majority of the community in the study area was being highly depended on Agriculture. This was because, sustaining of their life as well as income generating strategy was being used mainly from mixed agriculture. As it was described earlier, one can possible to say that highly dependency of the communities on agriculture

Table 5: Major consequences of land degradation in the study area

Consequences of land degradation	Frequency	Percentage
Poverty	20	63.33
Climate change	7	26.26
Gully expansion	3	10
Total	30	100

Source own survey 2008

was being aggravated the Land in the area was happened.

Climate Change

Deforestation stimulates higher accumulation of CO₂(carbon dioxide) on the atmosphere, these would continue depleting the ozone layers, which caused an increase of temperature on the atmosphere. The current serious issue in the study area was higher increase of temperature and climate changes, which affect the day to day activities and continued its impact on social, economic and environments. During interviews , they perceived that climate change was being taken place due to, higher increase of populations, frequent use of forests resource, urbanization, and resettlements programs which were some of the major factors highly accelerated temperature to be raised and as a result climate change in the study area.

Gully expansion

Gully expansion is the major consequence in the study area by applying high amount of water in the form of erosion to erode or deplete agricultural productivity. As a result of this people leave in the study area highly affected by gully expansion and to affect different agro forestry systems.

Regarding wild animals some the of the community leaders argued that nearly about 20 years ago there were a lot of wild animals, but today only few can be seen near forest fragments. The decreasing of their number was due to depletion of forests, which obligated them to go others, area having forest covers.

One of the interviews of the farmer, said that the only option to mitigate loss of soil and biodiversity was that encourage the habit of protecting the environment by practicing planting of trees on a sustainable manner, practice of a forestation program, area closure and etc. According to the community whatever the case, forests land area should be increased and even should be encouraged the programs which was being described earlier, this was, because practicing of a forestation program, was being played important roles which contributed not only for environmental sustainability, but also social, and economical sustainability.

Soil Fertility Improvement Practices

Farmers at individual level practice different land management activities mainly to increase agricultural yields and to conserve the natural environment on their plot of land. They practice a short-term benefit oriented soil fertility management and long-term benefit oriented

Table 6: Mechanisms of land rehabilitation practice in the study area

Mechanisms of land rehabilitation practices	Frequency	Percentage
Fertility management	19	63.33
Soil and water conservation	8	26.67
Gully rehabilitation	4	12
Total	30	100

land resource management activities.

For short-term effect, farmers apply chemical fertilizers to obtain high agricultural yield. Inorganic chemical fertilizer application is a prerequisite in the study area as many parts of the country experience due to loss of soil fertility which is caused by erosion (See Table 5.1).

According to survey results, crop rotation (76.1% and 69.7% of the respondents in Amba 6 kebele respectively) is one of the most important methods of improving soil fertility as well as conserving soils on cultivated fields. It is a method through which the nutrient content of the soil is improved by cultivating different crops on the same plot of land interchangeably.

This method again becomes more important when leguminous crops are part of the rotation system to improve the nitrate content of the soil. According to the information obtained from Amba 6 kebele and woreda experts, this system is one of the widely practiced system of soil fertility improvement in the study area which helps to obtain more outputs from the cultivated land. The rotation system mostly consists of cereals, legumes (mainly bean) and root crops like potatoes in the farm land in different seasons and years of cultivation.

Manure is used to be important input for promoting the fertility status of the soil. Its application to farmland raises the nutrient level of the soil, increases infiltration and reduces soil erosion. About 53.7% of the respondent in Amba 6. Currently, application of manure on farm lands has been decreasing from time to time as the number of livestock per household has been decreasing significantly for various reasons. Participants of community indicated that fragmentation of farm plots confine the use of manure only for homestead area rather than far away from their home.

In addition, the use of cattle dung as source of fuel for cooking instead of using it as organic fertilizer is another contributing factor for low application of manure for soil fertility improvement practice in the study area.

Regarding fallowing to improve soil fertility, the survey result indicates small contribution. Only 6% and 3% of the respondents in Amba 6 used fallowing to improve soil fertility respectively. Participants, no fallowing that can contribute to soil fertility improvement in the study area. Because of high population density, farmers have no chance to leave the land uncultivated.

Soil and Water Conservation Practices

In the study area, as many parts of Ethiopian highlands, farmers have a pool of indigenous knowledge with which they use and manage their land resources. They make

efforts to conserve their soils against erosion by applying a range of conservation techniques

Among soil and water conservation measures, which is widely used by farmers in the study area, in almost all villages, is contour ploughing. Ninety-four percent and ninety-seven percent of the respondents in Amba 6 confirmed that they protect soil from erosion through contour ploughing respectively. To establish the structure, the farm plots are ploughed horizontally; following contours so that those contour furrows are created with the help of iron plough. the furrows that are formed along contours help to hold the water until it infiltrates into the ground and hence reduces the damaging or erosive effect of surface runoff on plots of land.

Traditional ditches are the most extensively practiced measures used to conserve soil and water in the study area. The structures are established with the help of oxen-plough deep into the ground. This kind of practice has been used by farmers since longer times. When the land is being prepared for sowing to minimize the problem of seed loss after sowing. In addition, it also minimizes water logging problems as well as soil erosion.

According to information obtained from Amba 6, a group of two or more farmers who possess neighbor farm plots prepare water ways at the top of the slope. This is a common practice in the study area as this area is found at the base of Mount. . It helps protect crop fields from being damaged by powerful run-offs that come in such steep sloppy area.

Findings from the survey respondents indicated that, hillside terracing and check-dams were among the most frequently used physical structures used for soil and water conservation in the study area. However, it was noted from the Amba 6 kebele information that the terracing and check-dams were of poor quality that stay only for a short period of time, in fact until they face a repeated heavy rainfall. Moreover, the potential positive impacts of the conservation attempts had also been reversed by the simultaneous devastating act of the farmers themselves for cultivation, free grazing.

Forage strip and stone bounds (in some cases) are used as another technique for soil and water conservation practices. biological treatment of soil and water conservation activities are being practiced in combination with the physical soil and water conservation structures. The treatment of the land takes place in comprehensive way in all land use types such as in cultivated lands, grazing lands, forest areas and marginal lands of the study area.

Gully Rehabilitation Practices

Gullies which are intermittent stream channels longer than rills are created by concentrated rainfall runoff from the surrounding sloping land. Usually, gullies follow sheet erosion or result from neglect of rills. Most of the reasons behind gully formation in the study area include deforestation, cultivation of steep slopes, lack of fallow, less vegetative cover, overgrazing and insufficient soil conservation measures. According to

Table 7: The Extent of land degradation in the study area

Extent of land Degradation	frequency	Percentage
Very high	20	66.6
Medium	7	23.33
Low	3	10
No Land Degradation	---	----

the survey respondents, most of the aforementioned factors behind gully formation are testified to be existent and to be the major causes of land degradation in the study sites. In order to curb gullies, check-dam was widely constructed along water ways from tree shrubs or stones. This eventually helps raise the floor up to the level of surrounding and original ground. Cut off drains and planting trees and grasses along water ways are additional gully rehabilitation practices in the study

CONCLUSION

This study has attempted to investigate the challenges and prospects of land rehabilitation practices in Amba 6. The findings of the study indicated that the livelihood of the farmers in the study area depends on subsistence agriculture. The major economic activity for all sampled households is based on farming (about 92%). The average size of farm land owned by farmers is less than one hectare which limits the amount of production in the study area.

On the other hand, the findings indicate has serious land degradation problems as observed in other part on highland Ethiopia. This problem appeared to be one of the major challenges for crop production. Sheet and rill erosion are commonly observed in farmland whereas gullies are common in communal lands and edges of farmlands. Limited use of conservation structures, lack of fallowing, cutting trees for fuel and construction purposes, ploughing steep slopes and overstocking are the major immediate root causes of land degradation. The underlying causes of land degradation as identified by the study are population pressure, steep slope nature of the area and erratic rain fall pattern. More than half of the farmers in the study area are practicing crop production in erosion prone areas and still there is an expansion of cultivation in to marginal lands due to population pressure. This expansion of farming towards marginal area resulted in shortage of grazing land, deforestation and increasing trend in land degradation.

The livelihood of the community in the study area is affected by these land degradation problems. The productive lands become less productive and subsequently left uncultivated. About 76% of the sampled households recognized that there is land degradation in their locality and about 30% of the sampled households agreed that leaving lands due to loss of quality is the main cause of decreasing trend in land holding in the study area.

Regarding response to land degradation problem, there have been a range of land rehabilitation practices underway in the study area by local communities,

government and non-government organizations. The activities practiced in the study area include soil fertility improvement activities, soil and water conservation structures and rehabilitating degraded lands by agro-forestry, afforestation and area closure system. However as compared to the magnitude of the problem, these land management and rehabilitation practices are not enough to curb land degradation problem. There are also challenges that affect land rehabilitation practices in the study area.

The study revealed that different socio-economic and institutional factors determine land rehabilitation practices in the study area. Among the socioeconomic factors increase in human population is the major challenge. With the increased population, there is subsequent increase in the size of cultivated area which in turn resulted in the shrinking of grazing lands and expansion of the cultivation into areas formerly considered as marginal and extremely fragile. Continuous search for new cultivable land also challenges the construction and maintenance of soil and water conservation practices and closing extremely degraded area for rehabilitation.

Regarding to the involvement of family members and neighborhood in land rehabilitation practices, the finding of the study revealed that slightly more than half percent of the population have willingness and cooperation to involve in land rehabilitation practices. This indicates the increase of awareness of the community about the negative impact of land degradation. But the population which accounts nearly half percent did not show any willing to involve inland management and rehabilitation works. The reasons identified during the survey, exhaustion of the fertility of land and subsequent reduction in farm yields, deterioration of social values of helping each other and subsequent focus on personal gains, and decrease in productivity of land which discourage the need for additional labor from outside are the major one.

Economically, the decreased productivity of farm land and involvement in off- farm activities pushes away people from participating in land rehabilitation practices. In addition, people who engaged in off-farm activities cannot contribute labor supply for any land rehabilitation practices as these activities require large number of labor. Thus, from this, it can be concluded that the economic factors have played their own role in land rehabilitation practices.

Regarding the institutional support related factors, though efforts being made were reported by the government and non-government officials in the study area, none of the activities are enough to halt the problem of land degradation. From this, it is possible to conclude that inadequate integration of the government officials with local communities during planning and introduction of different soil and water conservation activities and the intention of government to fulfill the immediate need of the people are some of the problems observed in the study area.

In general, among the considered socio-economic and

institutional factors that influence land rehabilitation practices, the increasing number of population, involvement in off farm activities, decline in farm productivity, and inadequate attention paid by government toward securing alternate means of livelihood to ease pressure on land, the need to obtain short term benefits rather than long-term from land are the very important ones in the study area.

RECOMMENDATIONS

The findings of the research indicate that there is increasing trend in land degradation problem in the study area. Different land management activities are being practiced in order to conserve resource base and NGOs, none of the interventions can efficiently curb the problem. Therefore, based on the finding of the research, the following actions that are believed to play significant role in improving land rehabilitation practices and solving, at least minimizing problems of land degradation are recommended.

In association with the increased population pressure a number of adverse effects on the environmental conservation of the study area and land rehabilitation practices have been identified. Easing population pressure on natural resource dependence needs due attention. This can be achieved by resettlement program, continuous training and awareness creation on family planning, technological improvements in agriculture and development of other sectors of the economy to minimize burdens on natural resource.

In making intervention in land management practices, there should be active participation of local people primarily farmers. This helps to integrate indigenous land management practices with the new ones and enhance easy adoption and sustainable use of effective introduced practices. In addition, it is also essential to provide benefits to the local communities from enclosed area in sustainable manner which, in turn, increased the sense of one's resource

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