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The Impact of Income Generating Activities on the Environment: The Experience of Some Five Neighbouring Villages of Mt. Cameroon

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Abstract
The paper analyses the Impact of Income Generating Activities on the Environment of some neighbouring villages of Mount Cameroon. Data on access to land resources, exploitation of resources and its impact on the environment, and conflicting scenarios is obtained through a structured questionnaire and participant observation. The key findings of the study show that land resources are either inherited, leased, bought or acquired free of charge if they have never been exploited before. Income generating activities range from cultivation of cocoyams, yams, banana, plantains and vegetables; harvesting of spices and firewood; bee farming, snail farming, pig farming, goat rearing and hunting. Also, the study reveals that there is a strong and significant relationship between the mode of exploitation of land and environment degradation. Unsustainable farming practices include slash and burn, short-leases, shifting cultivation and illegal hunting of protected species which conflict with ecological and environmental regulations. Other situations of conflict arise when farmers encroach into farmland of neighbours in the same village or other neighbouring villages. Against this background the paper sees the need to continuously incorporate all stakeholders in these villages in the management of environmental resources as well as jointly creating buffer zones in the region to prevent unsustainable encroachment into habitats yet unexploited in the mountain. The paper posits that sustainable exploitation of resources in the region should respect outlined ecological and environmental criteria.
Keywords: Income generating activities, environment, Cameroon
JEL classification: B40, O44, Q01, Q50.

1. Introduction

The idea of conserving the tropical forests by using them more sustainably has become more fashionable, although occasionally not, especially when population pressures or market demand drives exploitation to non-sustainable levels. The pressure to exploit non-sustainably increases with rapid population growth as people tend to use forests to relieve pressure in overcrowded agricultural areas. This results in deforestation, especially where the people are unfamiliar with the forest or desire to continue an agricultural way of life. At the same time, people everywhere in the forest zone have the desire to increase consumption as the expanding world market economydictates. Barham et al (1999) show that, concern over the fate of the tropical rain forests and the people who depend on their forest resources has prompted much discussion on the promise of rain forest extraction by traditional communities for rural economic development and forest conservation. Other studies (Fearnside, 1989; Peters, Gentry and Mendelsohn, 1989; FAO, 1993) point to the significant contribution of rain forest products to household, local, regional and even national economies. Based on the recommendations of these studies, a good number of non-governmental organizations (NGOs) and other groups have been working to help traditional forest peoples secure their rights to the forest and develop better management strategies for the sustainable and mutually profitable harvesting of local non-wood resources with the hope to preserve the forest, conserve its resources and enhance rural welfare by raising the incomes of forest peoples. These studies argue that a key factor conditioning how forest people use their local resources - and thus generate their incomes - is the level and type of wealth (i.e. land and non-land assets) held by forest peasant households. They conclude that initiatives aimed at promoting sustainable resource use and poverty alleviation among rain forest peoples could improve their efficacy by giving greater attention to the role of wealth in income generation and by seeking ways to improve the prospects and paths for wealth accumulation of forest peasant households. In this regard, forest peoples pursue numerous activities to generate subsistence and commercial income, some of which are feasible only in certain seasons or under particular conditions. Their income-generation patterns are quite heterogeneous both among neighbouring communities and among households within communities (Anderson and Loris, 1992; Gunatilake et al, 1993: Coomes, 1996). Although on casual observation they may appear to generally pursue a broad mix of economic activities, including agriculture, fishing, hunting, gathering, and other forest product extraction, forest households actually tend to specialize, in some cases quite highly, in one sector. This specialisation can differ among households within the same community as well as across communities. Equally, land tenure and environmental conditions in these forests regions are closely related. Land tenure promotes land

use practices that harm the environment as well as serves to sustain the environment. This quest for income generation to sustain livelihoods impacts differently on the environment and in some cases result in conflicting scenarios. The fundamental problem is to determine the nature and magnitude of the impact of these activities on the environment of forests regions. The objective of this paper is therefore to analyse the situation in detail in Ewonda, Bwitinge, Bova, Bonakanda and Woteva, all neighbouring villages of Mt. Cameroon. More specifically, the paper analyses how people get access to land resources, how they exploit these resources and how this impacts on the environment. It equally analyses conflicting scenarios that result from income generating activities in the region. Based on the above, the paper contends that income generation activities do not significantly impact on the environment of the neighbouring villages of Mt. Cameroon.

The rest of the paper is divided into four sections. Section situates the study in its proper perspective by reviewing some empirical literature in the domain. Section is devoted to background of study area and method of analysis. Section four presents the findings of the study and the last section concludes the paper with some policy implications.

2. Some relevant literature

Oladeji (2016) examined the effect of land degradation on some income generating activities in some selected villages in Nigeria. The author used a sample of 180 crop and livestock farmers from randomly selected from a list of 1800 in seven villages of the Agricultural Development Programme Zones. Interview schedule was used as instrument of data collection. Results from the analyses revealed that Majority of the respondents are literate and have multiple income generating activities. Land degradation mainly affects income generating activities such as crop farming, collection of forest products and goat rearing. Also, involvement into income generating activities was significantly associated with Sex, age, educational level and household size. Significant disparitieswere found in farmers' income generating activities before and after land degradation. Indigenous practices adopted in controlling land degradation do not have significant relationship with farmers' involvement in income generating activities.The author recommended the intensification of farmers' education on environmentally friendly farming system by government, non-governmental organizations and community leaders.

A study by Uzokwe (2014) aimed at determining the agro-based income generating activities of rural women in Anambra State; ascertaining if there were differences in the income generating activities in sheet and gully erosion areas, establishing if the IGAs are affected by erosion and determining the extent to which they are affected in sheet and gulley erosion areas. The study made use of interview schedule and Focus Group Discussion(FGD) in order to collect data. A sample of 600 respondents was retained for the study using the stratified and purposive sampling technique. Findingsrevealed that the average age of respondents was 34years, 75.8% were married with an average of 4 children, 20% had no formal education and 76% of them were Christians .also, results showed that most of the women are involved in crop farming (87.85%), palm oil processing (61.75%), cassava processing (87.95%), keeping of local fowl (75.4%), sale of vegetables (62.9%), and goat rearing (54.85%). Goat rearing and crop farming were found to be the most affected IGAs in sheet and gully erosion areas. The study showed that the agro based IGAs of the women are affected by erosion and since land is their main factor of production, it is likely to affect their food security.

In a attempt to investigate the nature of the relationship between environmentaldegradation and the socio-economic status of Iko people, Udofia and Udom (2001) adopted a three phase approach; first, the collection and laboratory testing of soil and water samples from the ninety communities selected, and the second the administration of the questionnaires for socio-economic data, and finally linking the laboratory data obtained with the socio-economic data extracted. The factor analysis was first used to simplify the socio-economic data matrix and the environmental matrices.In order to investigate the relationship between environmental degradation represented by soil properties and physicochemical properties and the socio-economic status of Iko people, the authors used a multiple regression analysis. The outcome of the analysisindicated that soil degradation did not affect the socio-economic life of the people significantly. Among the water factors, only the Minor Nutrient factor (potassium) had a significant effect on the socio-economic life of the people (fishing) which served as the major means of livelihood. As against the popular believe that the poor are always responsible for environmental degradation, this study revealed that it is instead environmental degradation that lowers the socio-economic status of the people of Iko. Prevention of minor nutrients in the water is recommended in addition to integrated human development schemes, and developing effective capacity building. The relatively small number of empirical studies in this area justifies the relevance of this study. In fact very little research has been conducted to ascertain the effect of income generating activities on environment especially in Cameroon. Moreover, when they exist, most of the studies analyse the relationship the other way round that is the effect of environmental degradation on income generating activities. This study does not only add to the store of existing knowledge about the topic by investigating the effect of income generating activities on environment, but it also stands as a pioneer study in Cameroon.

3. Background and Methods

Buea is today made up of 85 villages. Those villages are inhabited by the Bakweris who have lived around Mount Cameroon for at least 4000 years. The urban part of Buea includes Molyko, Buea town, Muea, GRA, Mile 16, Clerk sand Federal Quarters. Ewonda, Bwitingi, Bova, Bonakanda andWoteva which are the focus of our study are just five villages of the many villages that constitute the rural rims of Buea as shown in figure 1.

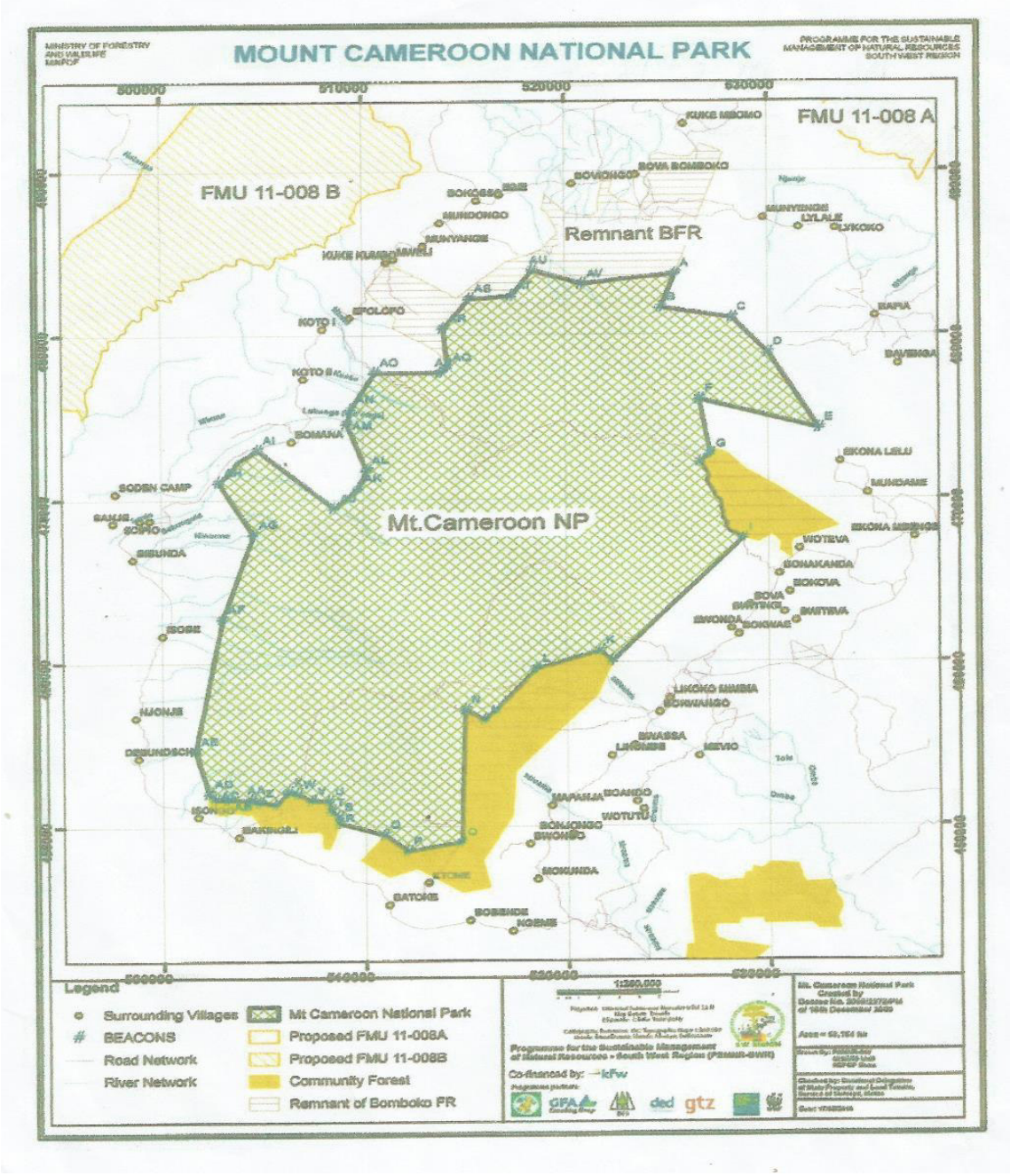

Figure 1: Map showing neighbouring villages of Mount Cameroon
Source: Mount Cameroon National Park Project

This paper seeks to examine the effect of income generating activities on environment in some selected villages around Mt. Cameroon. Given the exploratory nature of the study, the paper adopted both a qualitative and quantitative approach. The research instrument used for the study was a structured questionnaire which, together with interview could permit us to generate some statistics. The target population was the population of Ewonda, Bwitinge, Bova, Bonakanda and Woteva. The purposive sampling technique was used to ensure that all socio economic categories of the population were represented. The sample was made up of 57 farmers and data were collected in February 2015.

The Direct Delivery Technique was used to administer the questionnaire to ensure high return rate. The questionnaire was administered to people who own a farms or rear animals. The questionnaire was made up of

21 questions divided in various sections such as demographic profile of the respondent, type and motivation towards the activities, modes of exploitation of resources, impact of the activities on the environment. Methods of data analysis include descriptive statistics such as frequencies and percentages computed from the Statistical Package for Social Science (SPSS 16). The Chi Square test of association was also used to test for existence of significant statistical relationship among some selected variables. The Chi square test of association or independence was preferred for the study as it best suited the categorical nature of the variables. The test is conducted using the following formula of calculated value of Chi square:

$$x^2 = \sum \frac{(O-E)^2}{E}$$

Where:
O = observed frequency
E = expected frequency
In order to compute the expected frequency, the following formula is used:

$$E = \frac{f_r \times f_c}{N}$$

Where:
f_r = row total
f_c = columntotal
N = Grand Total
The degree of freedom is given by (df) = (r-1) (c-1)
Where:
r = number of rows
c = number of columns

In order to ensure the reliability of the instrument of data collection the Cronbachs-alpha coefficient was used. The result revealed that the items included in the questionnaire effectively measured what they were intended to measure as the Cronbachs-alpha coefficient was estimated at 0.81 which is greater than the 0.7 usually considered as the minimum requirement.

4. Analysis of the Impact of Income Generating Activities on the Environment

4.1. Access to land resources,

Table 1 below provides information about the mode of acquisition of land in all the various villages represented in the sample. Present in the table are the frequencies of various mode of acquisition of land.

Table 1: Mode of acquisition of land

Mode of acquisition	Bova	Ewonda	Bonakanda	Bwitinge	Woteva	TOTAL
Inheritance	3	0	1	2	1	7
Bought	3	4	6	4	5	22
Lease	6	7	2	5	4	24
Free	2	0	0	1	1	4
TOTAL	14	11	9	12	11	**57**

Source: The authors from field data

In all the villages land was inherited, bought, leased, or just acquired free. However, the mode of land acquisition varied among the five villages. More land was leased in Bova and Ewonda than in Bonakanda and Bwitinge for an average period of three years. A piece of land of about 70m^2 in Bova1 is leased for 75000FCFA for a period of three years. In Bonakanda land was quite often acquired through buying than other methods. In many parts of the villages, clearing the land was an effective way to lay claim to it. For example, forests are traditionally used for slash-and-burn agriculture by the people in these villages who claim customary rights to these resources. people who are not members of these villages who usually are from Mile 16,Molyko,and Muea acquire land by renting or free by cutting down trees further into the mountain and this hasresulted in the clearing of land on an extensive scale leading to, for example, the fires and smoke that sometimes cover the mountain.

4.2. Mode of Exploitation of Land Resources

Insecure or in appropriate land tenure arrangements were found to be linked to poor land use which in turn leads to environmental degradation. Lackof clear rights or very short term leases tended to reduce the incentive to undertake soil protection measures, plant trees, and improve the environment in other ways if they did not hold the land long enough to receive the benefits of their investments. This explains why slash and burn was common on leased land especially that given out on very short term basis. In Bova farmers who even bought land declare to sometimes clear forest and burn around big treesso that their leaves should dry to allow light reach the crops. They resort to burning for lack of inputs such as axes and engine saws to fell the trees.

Figure 2: Partial View of Slash and Burn in Bonakanda

Source: Authors

Farmers who inherited land incorporated reduced tillage through a method they call "till and go"in which only the spot on which the seed is to be planted is Sled. This method is seen to improve resource conservation and to reduce erosion and consequently environmental degradation.

4.3. Income generating activities and impact on the environment.

Field survey showed that the income generation system in the villages incorporate multiple cropping and greater activity diversity. In fact income generation activities in these villages include the cultivation of yarns, bananaplantain, vegetables, spices, cocoa, coffee; bee farming, hunting, snail farming and pig farming.

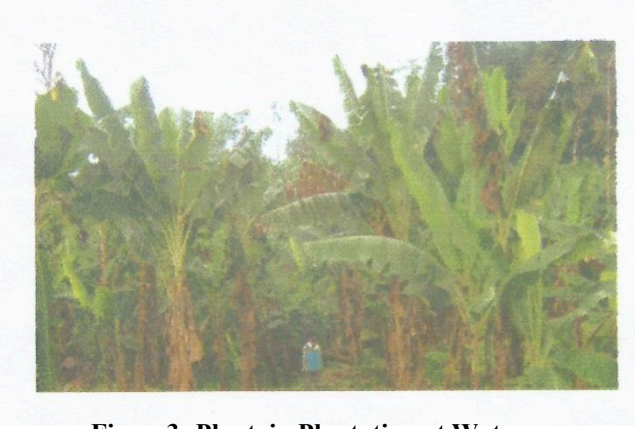

Figure3: Plantain Plantation at Woteva

Figure 4: Yam Farm at Bova

Source: Authors

Cultivation of crops including harvesting of spices was common to all the villages. Very few farmers attempted cultivating cocoa and coffee which theyacknowledge do not do well in the area. Bee farming and snail farming was common in Bonakanda while pig farming was more visible in Bova. Rearing of small animals such as goats was also common in the villages, Regrettably, the rearing activities were carried out in very small scale. Activities such as bee and snail farming, and rearing of goats tend, to reduce pressure on the forests resources.

When crossing the mode of exploitation of land and farmers perception of environmental degradation in their area, the following frequencies as presented in table 2 are recorded:

Table 2: Mode of exploitation and environmental degradation cross tabulation

			Environmental degradation					
			Strongly disagree	Disagree	Neutral	Agree	Stronglyagree	Total
Mode of exploitation	Slash	Count	0	0	2	4	1	7
		Expected Count	,4	1,2	2,0	2,6	,9	7,0
	Slash and burn	Count	0	2	11	17	6	36
		Expected Count	1,9	6,3	10,1	13,3	4,4	36,0
	Till and go	Count	3	8	3	0	0	14
		Expected Count	,7	2,5	3,9	5,2	1,7	14,0
Total		Count	3	10	16	21	7	57
		Expected Count	3,0	10,0	16,0	21,0	7,0	57,0

Source: The authors from field data

Table 2 above revealed that most of the farmers interviewed are conscious of the degradation of environment in their area due to their activities as 28 out of the 57 farmers agreed or strongly agreed that the environment was degrading. Carefulobservation of the table also indicates disparities of opinion depending on the mode of exploitation. Most of the farmers who practised “till and go” were convince that it had no serious impact on environment. None of them agreed that their activities impacted the environment negatively and significantly. Meanwhile most of the farmers who clear farms or practice slash and burn reported that both techniques had important effect on environment.

Table 3 below gives the calculated value of the Chi Square as well as the asymptotic significance (probability value) of the test.

Table 3: Chi Square test result

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	35,504	8	,000
N of Valid Cases	57		

Source: The authors from field data

The result from the Chi Square analysis shows that the modes of exploitation of land by farmers strongly affect the environment. This result is statistically significant at 1% given the asymptotic significance (0.000) which indicates that the calculated value of Chi Square (35.504) is far greater than the critical value of chi square at 5% and 8 degree of freedom (15.51).

Figure 5: Snail Project in Bonakanda

Figure 6: A Bee "Catcher in Bonakanda

Source: Authors

Hunting of animals (sometimes including protected species) is not uncommon in these villages. This conflicts with ecological and environmental regulations.

4.4. Conflicting scenarios from income generation activities.

There was found to be a close link between tenure and conflict in the five villages studied. Within the villages, competing claims for control, and use of land provoked conflicts. Population growth and changing economic

factors increased competition for access to land and this was regulated by the villages' tenure rules which are developed in response to dynamic social, economic and political relationships. When these tenure rules are unable to adjust sufficiently rapidly to changing circumstance, the chance of conflict arising is increased. For example, land is teased to foreigners with clear specifications on how to use it (e.g. to cultivate yarns and not plantains).When this agreement breaks down, the door is open for possible conflicts.

Also, it is not uncommon for Parties in a "sale" of land to have differing views as to whether the transfer is permanent or temporary, or whether the "buyer" hasthe right to sell the land to another person. Such situations become complicated when land is sold by the same person to two or more persons. There were also conflicts between members of families in which the family head sold part of the lineage's patrimony without the agreement of other entitled members. As earlier mentioned, illegal hunting of protected species is common in these villages and this conflicts with environmental legislation. Other situations of conflict in region include encroachment into farms of neighbours either in the same village or between one village and another village.

4.5. Constraints Faced in Income Generation Activities

In the effort to sustain their livelihoods, the people are confronted with a number of difficulties ranging from expensive inputs, theft, White ants, and Strong soils, and destruction from birds and animals. Lack of appropriate inputssuch as the axe and the saw left the farmers with no option than to bum cleared debris around big trees so as to create windows for sun light for crops. To solve the problem of theft, the people pay unexpected visits to their farms and put robot structures to frighten the animals. As a last resort, some farmers put magic spells in the farms to scare away thieves. As of now, the farmers have done little or nothing about the problem of white ants and strong soils which account for low yields.

5. Conclusion and Policy Implications

We have shown that in an effort to generate income, the activities of the people of some neighbouring villages of Mount Cameroon sometimes impact negatively on the environment. These findings are important and should not be ignored when examining the relationship between land tenure and environment. From a policy perspective, a number of recommendations can be made. Firstly, land lords should improve security of tenure of tenant farmers, for example, by ensuring that the conditions of their leases encourage them to adopt sustainable land use practices. For example, a lease agreement could encourage investment by providing compensation for unexhausted benefits at the end of the lease period, or by increasing the term of the lease and making it inheritable so that the disincentive effect is reduced or eliminated.

In order to improve the sustainable use of natural resources, land tenure strategies should be linked with appropriate lend management tools, such as agro-ecological zoning, to ensure that the land is put to a use that is suitable for its soil, land form and climatic characteristics. For example, the people of these villages should seek to know if cocoa and coffee are suitable for their land. Land and resource rights are essential. The people of these villages are likely to protect forest resources if they have clear rights or guaranteed access to these resources. After all, why should a person save a valuable tree if someone else can come along at any time and cut it?

One important question for these people to answer is what amount of income they generate from which crop at what environmental costs. In the meantime existing products offer the best chance of quickly creating national and international markets that can generate increased income in the short term for them. For the people to come out from their current impoverished condition they need to be competitive in the marketplace.

Perhaps, it is only logical that alternative markets and buyers should be sought to increase the incomes of the people. They should invest in production systems that reduce costs and makes production and production and processing more efficient. They should equally intensify diversification of production and reduce dependence on a few products/activities. This will be absolutely essential to the overall viability of income generation in the region, and consequently will enhance the conservation of the forest and the maintenance of biodiversity. However, caution should be taken not to diversify beyond a certain extent or else they will reduce their efficiency and overall impact on any single market. Ways should be sought to develop one product at a time, focusing initially on the largest volume and highest value commodities: The farmers can work together so as reduce tedium of working as individuals and to benefit from the economies of large scale production. It should also be important for the problem of white ants and strong soilsthat account for low yields in these villages to be properly investigated and action taken.

Above all, there is need to continuously incorporate the different stake holders in the villages in the management of environmental resources and to create buffer zones in the region to prevent further encroachment into yet unexploited habitats.

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