



Assessment of Rural Communities Awareness of Forest Resources Conservations, Benefits and Measurements in Western and Northern Geographical Zones of Sudan

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ABSTRACT

The current study was conducted in Bara and Um Rowaba localities in North Kordofan state during 2012/2013. The objectives of the study were to assess the rural communities' awareness about benefits of forest resources and the conservation of forest trees for sustainable use. Targeted sample were selected randomly from 20 villages using clustered multi stage random, total number of investigated household were 150. Descriptive statistics were used to analyze data and present results. The results showed that all indicators to improvement of environment through sustained forest resources management were achieved by less than 50%. Primary data was drawn from a constructed questionnaire and the results revealed that (32.9%) of the respondents didn't receive any kind of advices, Respondents that received advises concerning care of trees were (2.9%), tree conservation (2.3%), avoiding trees cutting (12.1%), tree planting (4.0%). while the recipients of all kind of advises represent in the table only (30.1%). Source of information about trees planting, the results showed that radio and government received (9.2%) of the respondents answers for each, local public as a source received (10.4%), the other sources represent minor percentages as explored, Sources of information about care of trees, the results obtained showed that (15.6%) of the respondents mentioned government, (12.7%) mentioned local public as source, (9.8%) mentioned radio, and (7.5%) mentioned foreign organizations. Other sources received very low percentages as depicted.

Keywords: North Kordofan, Geographical zones, sustainability, plantation

INTRODUCTION

The global consensus that environmental enhancement is becoming a cornerstone in recent development stream, which conventional development strategies failed to internalize. The failure of development programmes in tropical zones and subtropical zones in Africa and many other countries was found where vulnerability of environment is prevalent. The blame usually shifts to the communities for non-adoption of the innovations and applied technology transferred by development dealers, instead of development dealer to blame themselves who are one way in their thinking. The development dealers, usually seek what is economically feasible and socially acceptable and so on ...etc, while ignoring and forgetting the capability of environment as a foundation for success, in addition to the social consequences of applied technology transfer and its appropriateness, but not the communities to avail themselves. Chambers (1983) stated that, the links of modern scientific knowledge with wealth, power, and prestige conditions (outsiders) to despise, and ignore rural people own knowledge that are priorities in crop, livestock, and forestry research, reflect biases against what matters to poor rural people. Rural people's knowledge and modern scientific knowledge are complimentary in their strengths and weaknesses. Combined, they may achieve what neither would

alone. Whatever happens we have got the maximum gain and they have not. He continued the knowledge of any group of rural people, accessible to (outsiders) only through learning from rural people or, rarely, through ethnographic literature coded in anthropological jargon. In case of the third world, our failure as planners due to the reasoning and calculations which we had learned that ended up with a huge resource deficit, which could only be met by massive foreign assistances, also our countries economic structure get locked into a large import dependency with the high debt burden (Rahman, 1990). Indigenous knowledge, skills and culture would be humiliated in the hands of alien knowledge, and culture embodied foreign expertise and resources coming in on such scale, and beggar mentality rather than aspire in of dignified hard work would dominate the psychology of the society. He continued, we were trained mainly in this kind of deficit and dependent (development) planning. We had not learnt how to plan the mobilization of the human energy of the people, to plan to develop with what we have, not with what we do not have (Rahman, 1990). On the other hand, Meyerhott (1980) as cited by Brown (1981) stated that: Increasingly, people are recognizing that the social consequences of applied technology must be considered before enormous funds are allocated. "Because, what the eye does not see, the heart does not grieve about". But actually, where environment vulnerable, like our situation in North Kordofan, in addition to social consequences of developmental innovations, environmental vulnerability and its capability should be considered and improved before enormous funds for applied technology and its dissemination are allocated. The experience of many development projects in rural areas in North Kordofan showed insignificant progress for improving livelihood of rural people. So, shift in our thinking from community blame, which is a tendency to hold communities responsible for their problems, to the radical solution, which is the improvement of environmental capability, is the roadmap towards succession, instead of relying on the expression. "If the shoe does not fit, there is something wrong with your foot". According to our own opinion for our rural communities' development, there are many short comings to be solved, a thorough sociological studies of the communities themselves, and well understanding of diffusion and adoption of innovations theories, in addition to development of appropriate technology, and translation of those issues with regard to reality. Just dabbling with symptoms, will lead to ignorable results and benefits, and lack of effectiveness of extension. Hence, extension workers are leading crew of development in Sudan.

Forest in Sudan covered about (29.64%) of the total area of the country (FNC, 2004). Even that Sudanese awareness of environmental hazards refers to (1940s) Abdel Hamid, 1983). Due to soil exhaustion since (1960s), even (*Acacia Senegal*) failed to grow in some parts of its traditional zone, and is replaced by *Calotropis procera* (Pearce et al, 1990). While crop yield was highly decreased in western Sudan, and the problem has been exacerbated by continuous below average rainfall (Born, 1965). In 1976, Desert Encroachment and Rehabilitation Program (DECARP), was established for combating desertification. Till 1982, nothing has been done despite that many recommendations were stated, and some projects were implemented (Abdel Hamid, 1983). In (1980), Gum Arabic belt restocking project was started in Kordofan state; four locations were selected (Bara, Arrehad, Elobeid, and Um-Rowaba) as initial development poles to serve certain stated objectives within five years. The project devoted high emphasis to environmental deterioration, and intended to install the concept of forestry as community as well as government responsibility (UNSO, 1987). The project has development objectives as well as immediate objectives. The development objectives include desertification control, employment opportunities, and increase gum production. The immediate objectives include production of 12.1 million seedlings, 90% of *Acacia Senegal* to cover 40000 feddans, and 10% other species as wood lot, the second immediate objective is encouraging participation by utilizing effective extension program, and the third one is introduction of improved techniques of gum tapping and processing (UNSO, 1987).

Despite these efforts, astonishing information based on scientific evidences was declared as the real situation. Fries (1992) stated that forests in Sudan and semi-arid Africa are disappearing at rapid rate. Very little has been done with respect to utilization, conservation, and management for sustained and improved yield. IFPRI (2007) the ecologically adapted traditional systems and practices of land use existing in North Kordofan state, are under severe stress by the rapid socio-economic changes. Population pressure, over exploitation of forest resources, over cultivation of both cash crops and food crops, in addition to over grazing, have negative impacts in terms of resource degradation. Mustafa

(2007) stated that, North Kordofan state was affected by vegetation degradation due to human induced activities, and climatic variation such as prolonged droughts under poor land resource management. In addition to these evidences, the recent satellite images, according to Khairy (2007), showed noticeable and significant decrease in vegetation fraction in Bara locality in 1976, 1988, and 2003. Moreover, Pearce et al (1990) reported that, the major environmental obstacle to sustainable agriculture in the Sudan, is the fragile soil structure, which is highly susceptible to erosion and loss of fertility, if subjected to mono cropping and mechanized agriculture. Yadav (1992), stated that high population growth, market induced force, and public intervention, forced rural farmers to expand to marginal areas. He continued, in fragile soil such as Sudan, management is usually carried out through conservation by non-use, a forestation, and improvement of watershed, but as most people are rural farmers, environment conservation efforts should be devoted to decrease pressure on the cropping areas and vegetative cover. Also, many studies suggested that there is relationship between property rights and environmental problems.

Pearce (1990) stated that, one of the important policy features which impair natural resources quality in Sudan is the form of land tenure that is used, the ownership of the land is with the state, but the rights to use the land are allocated to cultivators. Tenure is insured if cultivation is maintained. But if there is sufficient pressure for land, fallow land can be lost. So, it is obvious that environmental problem in the Sudan, is of many dimensions. The solution need interdisciplinary approaches based of active participation of the communities. Also, concentration on *Acacia Senegal* and other few species for woodlot as only forest resources to deal with, without any consideration to other secondary forest resources that replaced these species in the vulnerable areas, the output will be negligible. Because the appropriate microenvironment in such habitat is not capable of maintaining a suitable growth unless those habitats are improved. According to my own knowledge and observations, the only forest resource that received high importance among politicians, economists, and natural resources improvement policy makers in Western Sudan, is *Acacia Senegal*. The efforts devoted to restocking of this tree through plantation and appropriate tapping techniques, and the corresponding research, are not showing reasonable progress. The picture in reality is not coping. For being more reliable, even improved tapping technique which is not affected by climatic changes and it is a pure extension activity, which can be realized by only efficient extension program based on assuring social mobilization. The adoption of using this technology (sonkey) is ignorable. The importance of appropriate tapping in improving natural resources comes from its role in gum production, and the health of the *Acacia Senegal* tree. Ballal (1991) reported that, the traditional tapping tool (axe) proved damaging, laborious, and unpleasant. The alternative tool (sonkey) proved to be more effective and efficient than (axe), it is less damaging to the tree, and increase the number of trees tapped per man significantly by 50% or more. Also Ballal indicated that for (sonkey) to be adopted there is a need for more extension work. Farmers claimed that they use (axe) instead of (sonkey) for reasons other than tapping such as clearing bushes, collecting fire wood, and cutting poles. So it is difficult to take both tools with them to the field (Ballal, 1991). For these reasons according to my own point of view, still (sonkey) in its existing form, is not an appropriate tool for adoption by the rural farmers when considering rural farmers preference. Reinvention to the existing form of (sonkey) by the communities or foresters is of high importance for high rate of adoption to be obtained.

MATERIALS AND METHOD

Sampling Technique

The multi-stage random sampling was followed for sites and villages selection, because the targeted sample does not differ appreciably from the total population with regard to the research problem, and the messages and packages delivered to rural communities by different development projects concerning the research problem. The rural communities of (NKS) are homogenous with respect to environmental problems affecting their livelihood and the surrounding habitat on which they are relying to satisfy some of their needs and requirements. Accordingly, the steps followed for site and villages selection, were explained below.

Site selection

From the four localities constituting (NKS), only two localities were studied Um rawaba and Bara. The justifications behind this selection were:

- Firstly, those localities have received a lion-share of the development projects implemented in Sudan for improving natural resources and environmental enhancement during the period following the drought year 1984.
- Secondly, the knowledge and awareness of environmental problems among the communities constituting those localities are assumed to prevail, and useful information that supports the research is also assumed to be obtained. These are due to the accumulative experiences that might be gained by the communities from the long periods of exposure to the various development projects.

Village selection

From the two localities, only the village in which North Kordofan Rural Development Project (NKRDP) works has been considered.

Sample Size

The sample size of 150 respondents was determined on scientific basis, using the following equation.

$$S = Z^2 * N * E(1-E) / [(A^2 * N) + (z^2 * E(1-E))]$$

Where:

S = required sample size; the number of items to be randomly selected for evaluation as calculated using the get attribute sample size form.

Z = factor for the desired confidence level 95% = 1.96; the degree of certainty that is the samples characteristics of the entire population, a measure of accuracy.

N = population size 3456; the total number of values from which to draw a sample. Must be an integer number between 0 and 4 294 967 925

E = expected error rate 5%; an estimate of the percentage of the items that do not meet the attribute test or tests defined. Must be an integer or decimal number greater than (0) and less than (100).

A = desired precision ratio $\pm 3\%$; the acceptable percentage variance (plus or minus) in the desired confidence level.

Sources of Information

Primary data

The relevant information of primary data has been derived from the targeted respondents, as primary sources of the required data, through well designed questionnaires and from professionals the questionnaires were filled using face-to-face interview, in addition to researcher observations and group discussion to satisfy the reliability of the study.

Statistical Analysis

Descriptive statistics was used for obtaining the results. Percentages and mean percentages were drawn to interpret the results.

RESULTS AND DISCUSSION

Respondent's relation with extension institution (Table 1) depicts the respondents exploring non-relations to the entire institutions performing extension work which was (63.0%), those showed weak level of relation were (13.2%), and moderate level were (10.9%). The lower levels were found were (8.9%) those of good relation were (8.9%) and the respondents of very good relation were (41.1%). It's obvious that the relationship between the respondents and the institutions performing extension work is reversal, and non-relationship outweighed the total level of relations. The higher percentages of non-relation were found with range administration and forestry extension the most important institution concerning natural resources improvement.

Table 1: Respondents Relations with some Extension Institution

Institution	Relation				
	Non	Weak	Moderate	Good	Very good
Agricultural extension	54.9	16.2	15.6	8.7	4.6
Forest extension	65.3	7.5	14.5	6.9	5.8
Veterinary extension	53.2	17.3	11.6	14.5	3.5
Range administration	72.3	12.7	5.8	5.8	3.5
NGOs	69.4	12.1	6.9	8.7	2.9
Total	315.10	65.8	54.4	44.6	20.3
Means	63.0	13.2	10.9	8.9	4.1

Source: Field survey, (2012). N = 150

The results depicted that (46%) of the respondents was less than moderate awareness about reserved forests, and (37.6%) do not had awareness about reserved forests, . (8.7%) of respondents level of knowledge was weak. In the meantime, the respondents with moderate knowledge were (31.2%), (16.8%) had good knowledge and very good knowledge were (5.8%).The results of respondents about public forests awareness (37.6%) were lacking of awareness , (12.1%) their awareness was weak. the moderate level of knowledge were (31.2%) ,the respondents with good level of knowledge were (13.3%) and very good level were (5.8%). The results about Respondents' levels of environment conservation awareness revealed that (49.2%) of the respondents had moderate level and (32.4%) were the higher awareness. (18.5%) were with weak awareness level. Results awareness about a forestation (45.7%) about the concept was not found, (13.9%) were had a weak awareness. (29.5) were had moderate awareness, (8.1%) were had good awareness, and (2.9%) were had very good level of awareness (Table, 2).

Table 2: Respondents Awareness about some Environmental Issues:

	Level	%
Respondents awareness about reserved forest	Don't know	37.6
	weak	8.0
	Moderate	31.2
	Good	16.8
	Very good	5.8
Respondents awareness about public forest	Don't know	37.6
	Weak	12.1
	Moderate	31.2
	Good	13.3
	Very good	5.8
Respondents awareness about environment conservation	Don't know	32.4
	weak	18.5
	Moderate	34.1
	Good	8.7
	Very good	6.4
Respondents awareness about a forestation	Don't know	45.7
	weak	13.9
	Moderate	29.5
	Good	8.1
	Very good	2.9

Source: field survey (2012) N=150

The results (table 3) showed that (20.8%) of the respondents lacked awareness of forest conservation as concept. (13.9%) of respondents were had weak awareness. (38.1%) were had moderate of awareness and (20.8%) were had good awareness. (6.4%) of the respondents were found to had very good awareness. Results reviled that (38.2%) of respondents were had no any awareness about soil deterioration and (12.7%) were had weak awareness. (24.3%) of Respondents were had moderate level of awareness, (18.5%) respondents were had good awareness and (6.4%) were had very good level of awareness. Results of respondents about the concept (desertification) awareness showed that (20.8%) were had lack of awareness , (8.1%) of respondents showed weak level of awareness, (39.9%) of the respondents had moderate level of awareness, (23.1%) had good level, and (8.1%) were had very good level. The results showed that the respondents awareness about desert creeping (21.4%) were lack of awareness, (17.3%) had weak awareness, (35.8%) had moderate level of awareness, (17.3%) had good level, (8.1%) Had very good level of awareness about desert creeping. Results of awareness about forest deterioration showed (22%) of respondents had no awareness about the concept, (35.3%) were had weak level of awareness, (12.1%) were had moderate level of awareness, (23.1%) were had good level of awareness and (7.5%) were had very good level of awareness about the concept.

Table 3: Respondents awareness about some environmental issues:

	Level	%
Respondents awareness about forest conservation	Don't know	20.8
	weak	13.9
	Moderate	28.1
	Good	20.8
	Very good	6.4
Respondents awareness about soil deterioration	Don't know	38.2
	weak	12.7
	Moderate	24.3
	Good	18.5
	Very good	6.4
Respondents awareness about desertification	Don't know	20.8
	weak	8.1
	Moderate	39.9
	Good	23.1
	Very good	8.1
Respondents awareness about desert creeping	Don't know	21.4
	weak	17.3
	Moderate	35.8
	Good	17.3
	Very good	8.1
Respondents awareness about forest deterioration	Don't know	22
	weak	12.1
	Moderate	35.3
	Good	23.1
	Very good	7.5

Source: field survey (2012) N=150

Results (table 4) the awareness about the benefits of forest resources respondents about their, the forest resources considered as non-available were (85.5%) of *prosopis sp.*, (80.9%) of *Adansonia digitata*, (79.2%) of *Acacia melifera*, (77.5%) of *Acacia nubica*, (74%) of *Greiwa tenax* and (73.4%) of *Boscia senegalensis*. Higher useful resources were (96%) of *Ziziphus spina-christi*, (85.5%) of *Azadirchdicha indica*, (75.7%) of *Leptadenia pyrotechnica*, (69.4%) of *Acacia senegal* and (65.3%) of *Calotropis procera*. While non-availability of resources which were considered as useful, (30.1%) for *Acacia senegal*, (4%) for *Ziziphus spina-christi*, (14.5%) for *Azadirchdicha indica*, (28.9%) for *Calotropis procera*, and (21.4%) for *Leptadenia pyrotechnica*.

Table 4: Respondents Awareness About the Benefits of Forest Resources

	F	%
Awareness about the benefits of <i>Acacia senegal</i>	Not available	30.1
	Useful	69.4
	Not useful	.6
Awareness about the benefits of <i>Ziziphus spina-christi</i>	Not available	4
	Useful	96
	Not useful	0
Awareness about the benefits of <i>Gereiwa tenax</i>	Not available	74
	Useful	26
	Not useful	0
Awareness about the benefits of <i>Azadirachtica indica</i>	Not available	14.5
	Useful	85.5
	Not useful	0
Awareness about the benefits of <i>Prosopis sp.</i>	Not available	83.2
	Useful	2
	Not useful	14.5
Awareness about the benefits of <i>Acacia nubica</i>	Not available	77.5
	Useful	17.9
	Not useful	4.6
Awareness about the benefits of <i>Adansonia digitata</i>	Not available	80.9
	Useful	19.1
	Not useful	0
Awareness about the benefits of <i>Acacia melifera</i>	Not available	79.2
	Useful	20
	Not useful	.6
Awareness about the benefits of <i>Calotropis procera</i>	Not available	28.9
	Useful	65.3
	Not useful	5.8
Awareness about the benefits of <i>Leptadenia pyrotechnica</i>	Not available	21.4
	Useful	75.7
	Not useful	2.9
Awareness about the benefits of <i>Boscia senegalensis</i>	Not available	73.4
	Useful	26
	Not useful	.6

Source: field survey (2012) N=150

Results (table 5) about respondents relation with Extension Institutions, The results showed that (54.9%) of the respondents had no relation with agricultural extension, (16.2%) have weak relation, and (15.6%) their relation was moderate, (8.5%) were had good relations and (4.6%) were had very good relations with agricultural extension. According to results (65.3%) of the respondents had no any relation with forestry extension, (7.5%) had weak relation and (14.5%) had moderate relation. (6.9%) and were had good relations and (5.8%) were had very good relations with forestry extension. Relation with veterinary extension results revealed that (53.2%) Respondents were had no relations with veterinary extension, (17.3%) were had weak relations, (11.6%) were had moderate relations and (14.5%) were had good relations with veterinary extension. Those who expressed very good relation were (3.5%) of the total number of respondents. Relation with range administration according to the result (72.3%) of the respondents has no relation with range administration and (12.7%) had weak relation. (5.8%) of the respondents were had moderate relations and (5.8%) were had good relations and (3.5%) were had very good relations with range administration. Results of respondents about relation with foreign organizations showed that (69.4%) of the respondents had no relation with foreign organizations, (12.1%) had weak relation, and (6.9%) had moderate relation, (8.7%) were had good relation, and (2.9%) were had very good relation with the foreign organizations.

Table 5: Respondents Relation with Extension Institutions

	F	%
Extent of relation with agric. extension	None	54.9
	Weak	16.2
	Moderate	15.6
	Good	8.7
	Very good	4.6
Extent of relation with forest extension	None	65.3
	Weak	7.5
	Moderate	14.5
	Good	6.9
	Very good	5.8
Extent of relation with veterinary extension	None	53.2
	Weak	17.3
	Moderate	11.6
	Good	14.5
	Very good	3.5
Extent of relation with range administration	None	72.3
	Weak	12.7
	Moderate	5.8
	Good	5.8
	Very good	3.5
Extent of relation with foreign organization	None	69.4
	Weak	12.1
	Moderate	6.9
	Good	8.7
	Very good	2.9

Source: field survey (2012) N=150

Results (table 6) about the respondent's exposure to activities done by some extension institutions. Exposure to activities done by agricultural extension the results indicated that (63.6%) of the respondents didn't experience any activity done by agricultural extension in their areas, and (27.7%) were contacted by extension work. Results about exposure to activities done by forestry extension according to results (72.3%) of the respondents were not exposed to any activity done by forestry extension, and (22%) were exposed to general extension work. Results about Exposure to activities done by veterinary extension showed that (65.3%) of the respondents were never exposed to any activity concerning veterinary services, while (24.9%) were exposed to general extension work.

Results (table 6) about kind of advises received regarding forest resources, results revealed that (32.9%) of the respondents didn't receive any kind of advices (table (7). Respondents that received advises concerning care of trees were (2.9%), tree conservation (2.3%), avoiding trees cutting (12.1%), tree planting (4.0%) while the recipients of all kind of advises was (30.1%) Table (7).

1. Source of information about trees planting: The results showed that radio and government received (9.2%) of the respondents answers for each, local public as a source received (10.4%), the other sources represent miner percentages as explored in (table 7).

2. Sources of information about care of trees: The results obtained showed that (15.6%) of the respondents mentioned government, (12.7%) mentioned local public as source, (9.8%) mentioned radio, and (7.5%) mentioned foreign organizations. Other sources received very low percentages as depicted in (table 8).

Table 6: Respondents perceptions About kinds of Advices Received

Advices	%
None	32.9
Care of trees	2.9
Tree cons& avoid. Cut	3.5
Tree conservation	2.3
Tree planting	4.0
Avoiding cutting	12.1
All of them	30.1
Care tree& tree planting	3.5
Care .t.& t. cons& t. Plant	2.3
Care t.& tree cons & avoid cut	4.0
Care tree& tree cons	2.3
Total	100.0

Source field survey (2012) N = 150

Table 7: Respondents Sources of Information about Trees Planting

Source	%
Governmental	9.2
Gover& public& radio	4.0
Gover& organiz& publ& radio	0.6
organiz& radio	2.3
Gover& public	2.3
Gover& organ& radio	0.6
Gover& organ	2.9
publ& radio	4.6
Organization	8.1
Public	10.4
Radio	9.2
None	38.7
Gover& radio	5.8
Gover& radio& TV	1.2
Total	100.0

Source field survey (2012) N = 150

Table 8: Respondents Source of Information about Care of Trees

Source	%
Governmental	15.6
gover& publ& radio	4.0
gover& organiz& publ& radio	1.2
gover& publ	1.7
gover& organ& radio	0.6
gover& organ	2.3
publ& radio	5.8
organ& radio	0.6
Organization	7.5
Public	12.7
Radio	9.8
None	30.6
gover& radio	5.8
gover& radio& tv	1.7
Total	100

Source field survey (2012) N = 150

Table 9: Respondents Sources of Information About Tree Seedlings Production

Source	%
Governmental	5.2
Gover& publ& radio	2.3
Gover& organiz& publ& radio	1.2
Gover& publ	0.6
Gover& organ& radio	0.6
Gover& organ	0.6
publ& radio	2.3
Organ& radio	0.6
Organization	3.5
Public	2.3
Radio	5.8
None	72.3
Gover& radio	2.3
Gover& radio& tv	0.6
Total	100.0

Source field survey (2012) N = 150

Table 10. Respondents Sources of Information About Importance of Trees

Source	%
governmental	16.2
Gover.& publ.& radio	4.6
Organ& publ.	1.2
Gover.& organiz.& publ.& radio	1.2
Publ.& radio	5.2
Gover.& publ.	1.2
Gover.& organ& radio	1.7
Gover.& organ	3.5
all sources	0.6
Organ& radio	1.2
organization	4.6
Public	16.8

Radio	11.0
None	23.7
Gover.& radio	5.8
Gover.& radio& tv	1.7
Total	100.0

Source field survey (2012) N = 150

CONCLUSION

In many development activities pertaining to natural resources improvement, theories of diffusion and adoption, social structure, and social roles, were brought in mind as cognitive concepts and have never been considered in practical actions when intervention to communities of concern occurred. The other point is that, most of the development agents themselves were not well acquainted with the tools of these theories and lacking the relevant information, which are very important to bring about effective communication (psychomotor). The awareness of the communities about care of tree, tree plantation; relationships with extension institutions and benefits of forest resources were feeble.

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