

# SAO CHANG COLLEGE JOURNAL

June 2011- July 2012  
(An Annual Journal)

Volume 1 No. 1



**Motto : Deeds Not Words**

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Internal Quality Assurance Cell (IQAC),  
Sao Chang College,  
Post Box No. 25  
Tuensang- 798612, Nagaland  
Phone: 03861 220232 Fax: 03861 220232  
E-mail: : sctsg@gmail.com  
Website: www.sctsg.co.in

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Papers presented during the inter-departmental Seminar conducted by the Educational Research, Innovation and Consultancy Cell (IRIC), Sao Chang College and other contributed articles.

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# FOREWORD

It is, indeed, a great pleasure to write the foreword of the first issue of the Sao Chang College Journal. We are living the age in which the fund of knowledge is growing at a phenomenal rate and this journal is an addition to that fund. It has been prepared to meet the informational need of students, teachers and administration with concern not only for highlighting the ongoing activities of the college but also to excel the college in its pursuit for excellence.

Despite the hurdles of slow pace of infrastructural development, the college has been giving its optimum efforts to adapt and implement its academic programs for the benefit of the staff, students and larger interests of the society as well. With the 39 years of sweat and tears interspersed with joy of fulfilment, we are proud of our records of achievements through the struggle is still on to reach greater heights. The firm commitment of the faculty towards the goal of academic excellence can be taken to measure our worth.

The current development program that inter alia includes the conduct of seminar has now become the integral part of our academic exercise. The seminar has brought to focus some facets of life issues which are important for being relevant and contemporary. It is heartening to see that the entire academic community of the college responded enthusiastically in the departmental seminar which is by itself an indicator of a progressive college and progressive society. The continued, commitment, professionalism and commendable efforts of our community of faculties have allowed the college to cope with the ever changing educational needs, i.e. to put in to action various plans including departmental seminar.

I had the opportunity to personally attend most of the seminars in which the power-point presentation of the topic with specialized explanation and queries from the our enthusiastic audience made the seminar session lively, full of vigor, informative and which often led to a brainstorming exercise.

No words can adequately express appreciation of the hard work which has been put in by all the teachers in this important task of this publication of this journal. I take the opportunity to acknowledge their achievements and express my heartfelt thanks to all our teachers and editorial board members who were instrumental in bringing out this inaugural issue of the journal.

-/Sd

**(S. Chubasangla Chang)**

Principal,

Sao Chang College,

Tuensang, Nagaland.

## EDITORIAL .....

*The Journal of Educational Research and Extension, the first edition since the inception of the college in 1973, will go in to the golden pages of history. Indeed the journey of the college that commenced from a very modest beginning was "one small step" towards a "giant leap" for the educational aspirants of Tuensang district. The tiny seed planted on 1<sup>st</sup> July, 1973 by the farsighted leaders and well-wishers has now grown to a fruit-bearing tree and the college motto "Deeds Not Words" reminds us of nurturing it.*

*With the motto "Towards Excellence" and to achieve a centre of excellence, the Government of India on 15<sup>th</sup> August 1998 in commemoration of the 50<sup>th</sup> Anniversary of India's independence, declared Sao Chang College as the "Golden Jubilee College". The distinction urges teachers to embrace new challenges of transformation in the college academia and of late there has been a growing emphasis on quality education for which assessment and accreditation by the NAAC is inevitable. Therefore, the pedagogy, inter alia, is focusing significantly on the teachers' upskill, ideas and innovations and as a part of several quality assurance measures, departmental seminars were introduced in the college in the early part of 2011. The ongoing seminars providing teachers' interaction with each other besides teaching in isolation has proved to be effective, useful and successful.*

*"I cannot teach anybody anything; I can only make them think" Socrates. The present journal is not to teach but to spotlight issues and subjects pertaining both to humanities and sciences. Varieties of interests ranging from the 'Green Chemistry' to the utility of 'Fractal Geometry'; de-recognition of planet Pluto to the problem of Climate Change and on the side of humanities the fascination of how the Despair can even be Spiritual in Poetry; the application of Applied Sociology in the Family; the burning issue of Ombudsman in the form of Lokpal and also topics more of local importance disseminating information on the Working of VDB; Development of Education in Ao area and glimpse of Naga-Burmese Trade relations have been enshrined in this edition. We hope the subjects, relevant to the times, are to the expectations of our inquisitive readers.*

*We acknowledge with thanks the valuable efforts of our contributors. We owe our indebtedness to all our presenters, the moderators, recorders, rapporteurs and coordinators of the departmental seminars for their ceaseless efforts and works. We also express our deepest gratitude to the Principal and the IQAC of the college whose guidance we had the privilege to garner.*

*The refreshing words 'nothing is achieved before it be thoroughly attempted' shall cherish our future endeavor before the next edition is attempted.*

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# Applying Applied Sociology in the Family

Longtichang Tzudir  
Asso. Professor  
Dept. of Sociology

## Abstract

Applied Sociology is a part of everyday life. Most people may not think of family as a small society or a micro level society within itself. All families have a hierarchy of power beginning with the head of the household which tends to be the father. The way a family forms its own small society is interesting. Family roles have been changed dramatically off late. Thus, by applying Applied Sociology in the family following the micro level study will help in breaking down the scale of the issues at hand.

## Introduction:

Applied Sociology is a branch of general sociology which at its basis is the scientific study of society as a whole. Applied sociology is what has been deemed as the "practical side" of sociology. That is because applied sociology takes sociological theories and research and applies these knowledge to sociological methods which are carried out in order to find solutions to problems within society. According to Grove and Moore, applied sociology would include problems of poverty, crime, immigration, race, the family, the social hygiene, mental defects, housing, public opinion, and the organisations and practices of modern philanthropy.

Applied sociologists work in a wide variety of settings including universities, government, and private practice, using sociological methods to help communities solve everyday problems, such as improving community policing and crime prevention, evaluating and improving drug courts, assessing the needs of inner city neighbourhoods, developing the capacity of an educational system, or promoting the development of housing and related resources for aging populations. As Davis observes, "we want to build the society for the better. There are certain citizens who may be contented and do not want to change, but we must be careful not to give them undue weight. So long as there are people who feel that they are not receiving justice or fair play to that extent society needs reconstruction. It is the function of Applied Sociology to reconstruct that society".

Today applied sociologists play an important role. As societies begin, grow and merge sociologists are reading into every aspect and analyzing where there are problems and applying tested methods to ease those problems. Applied sociologists work in every level of government; local, state and national. These social scientists work every day to create a more functional society that serves all the people equally. They also work for community organizations, public administration and even businesses to solve problems of social organizations within smaller environments. Another role of sociologists today is to work with financial companies such as those who issue credit cards and internet companies such as social media websites to understand user behaviour and make for a better experience.

This same analysis and application of corrective methods can be applied by people in many aspects of their lives. By taking a deeper look at a problem, understanding how elements are interrelated to create the problem and knowing different ways in which we can approach the situation we have a better chance at alleviating the problem.

## **Applying Applied Sociology in the Family**

The family unit in terms of applied sociology is a micro level society, or the smallest structure of society within our vast world of societies. It consists of more than one person that forms the most intimate and personal of groups. Though it may be a very small group of very like-minded people there are still guidelines in place that govern the functionality of the family and create behaviours within the group which makes the tiny society distinguishable from others.

Applied sociology is a part of everyday life. Families experience sociological changes when parents get divorced, a new job is taken, or they get discriminated against. The way a family forms its own small society is interesting. Applied sociology is used to find and address the problems within a society by using various methods that are based on a theory and then tested using both evidence that can be measured and evidence that is more sensory. Looking at your family as a small society you can better understand how these methods can be used to analyze and correct your own problems.

Within the family unit there are still social roles that the family members take on and that are aware to everyone in the group. For example, traditionally the father is the head of the family with the mother a close second, a partner. However, the unique family structures that are becoming prevalent make for interesting questions as to the roles of the family. Family roles have change dramatically. Fifty to sixty years ago, families were merely based on the degree of precision and the roles performed by the parents. Now days the primary family roles which were initially the husband's responsibility such as income, household repairs, car maintenance, and paying the bills, have disbursed to the wives and children. Today, wives share if not completely take over the primary roles and do not only hold the responsibility for cooking, taking care of the children, and performing the household chores. It is not uncommon to now find single parent led families, grandparents raising grandchildren, step families that combine two family units and other combinations.

Still the fact remains that there is a power hierarchy within the family society and each member has their societal roles. Using applied sociology within the family unit is very similar to practicing it at the micro level. The micro level focuses on the smallest societies which includes the family. Like any applied sociologist in order to use the science within your society you must first understand that society.

It should be easy as a member of your family to recognize the key traits that form the family society. There are four areas in which a micro society like a family unit creates the ideas that govern it.

- The first is socialization. Socialization is the creation of shared beliefs and ideals that led to the norms of a micro society. Socialization is the indicator as to how one should interact within a society. An example of socialization would be sharing every meal at the table instead of in front of the television because that is family discussion time.
- Segregation on the other hand is the separation of parts of a society that are found to function better when separated from the whole. Even within the family there are some activities that people are far more comfortable performing in their own space on their own that could otherwise lead to conflict. It's like each family member having their own room.
- Ritual is also involved in micro level societies. In this circumstance ritual refers to actions that are repeated, typical interactions for the society in a certain situation. They are the action that come second nature within the setting and expected. Tucking a child before bed can be a ritual within a family unit.
- Sanctioning is the fourth social control that makes up a micro society. This is the one on one interaction of reading another person's actions and expressions to determine the appropriate behaviour within the society. By interpreting these gestures and expressions members of the society react to different situations as they understand they should in that moment. It is the standard I will count to three routine that parents use when a child is about to be reprimanded.

By understanding how these elements create the family unit you can better understand the interactions between the family members and the ideas and actions that link you together as a miniature society. As a society the family has overall institutions and policies as well as smaller components that may not affect every member in the same way.

If the larger policies that affect the group as a whole are not functioning then the family unit will experience stress. When considering the policies that govern the family every member must be taken into consideration since each individual forms the whole. However, the social roles of each member must also be taken into consideration. The head of the family is the one who keeps order by setting rules and enforcing them.

In the case of problematic children it could be a refusal to recognize their social role in the family. By helping them understand their social role and explaining how it factors into the society children can better understand the need for such regulation. This is especially true if you actively involve the child and really incorporate their needs and thoughts into the policies that are set.

By using the interview method of applied sociology you can discover what factors are important to each family member, what is not working or is not fair within the current policies, and get an idea as to the changes that can correct problems. Interviewing is a direct way to gain information that can be both measured or a sensory feeling as well as give you the opportunity to observe a family member which is another applied sociology method for gaining valuable information.

An annual family summer vacation would be a circumstance for using these applied sociology methods. It is a policy that affects the entire group, and one person being displeased with it can affect the enjoyment of the entire group. Social roles must still be considered with those paying for the trip being at the top of the hierarchy. However, by asking each member things like where they would like to go, what type of activities they would like to do, and the reasons for their answers you may get surprising answers and ideas that help in the planning. If nothing else no one can complain if they feel they were all part of the decision making process.

The applied sociology technique of content analysis can help you improve communication within the family. There is no denying that age can create a language barrier and this is largely due to the various societies outside the family that members belong to. Content analysis involves studying the type of media that a family member is exposed to and absorbs.

As we take in mass media and other media such as books and newspapers it is a form of communication. We learn from and are influenced by the media we consume thus affecting how we communicate with others as well. Think about someone who watches nothing but MTV, their vernacular is going to be decidedly more youthful and likely laced with the newest catch phrases and slang.

Content analyze also studies the way in which people react to the media they take in. What is it that sparks interest? Does something get them discussing a subject further? This intake of content leads to outward actions and communications. It is worth the time to understand what outside influences are affecting the way your family members communicate. You will have a better understanding as to what will communicate your own ideas more affectively, how they will react to certain information, what interests them and more. Even knowing how certain ideas affect their disposition will aid you in communicating better with your family members.

These are just a few ways in which you can apply applied sociology methods within your own family. By looking at the family unit as the micro level society it is, you can better analyze where improvements can be made to make the society function better to meet the needs of each member.

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# Climate Change and its Impact on Ecosystem

Mr. Lilongchem Thyü,  
Assistant Professor,  
Dept. of Zoology.

## **Abstract**

*There is a steady rise in the average temperature of the earth which is subsequently affecting the over-all climatic condition. We now call this-Climate Change. Climate change is posing a great threat to the very existence of lives on earth. It is not only affecting our daily life but also the biosphere at large. Different ecosystem and species that helps function the ecosystem is degrading, aiding in the collapse of the very ecosystem that support us. Steps needs to be taken so as to protect and conserve our environment and the different species living there. It does not require a species-oriented or an ecosystem oriented conservation tactics only but a larger approach where experts from all disciplines encompassing various fields can be roped in to counter the raging problems that we call climate change.*

## **Introduction**

The water vapour, carbon dioxide and methane in the atmosphere form a blanket of gases that does not allow the solar radiations to escape back to space. This phenomenon called green-house effect is essential to maintain the earth's temperature at a habitable level. Unfortunately, human activities have been making the blanket of green-house gases (GHG) "thicker". As carbon dioxide is increased by various human activities like industrialization and deforestation, the earth's temperature is becoming warmer causing what is now called GLOBAL WARMING.

The discomfort that one gets on hot days is just the tip of the ice-berg. Because the change in global temperature is leading to fluctuation in seasons, precipitation and even change in the phenology of plants and animals, which is going to have a devastating effect on the diversity of ecosystem and species. This report is a humble attempt to bring out a gist of the impact that climate change can have on environment and its inhabitants.

## **Climate change**

The average temperature in many regions has been increasing in recent decades. The global average surface temperature has increased by 0.7°C over the last century and is predicted to continue rising. Globally the year 1998 was the warmest and the 1990's the warmest decade on record. All these were a result of a phenomenon called green house effect. The earth is becoming warmer day by day.

In fact, by the late 1980's, scientist began to suggest that earth's energy flux was no longer in balance. The warming tendency was affecting the elements of the climate system. The climate itself was changing. The earth was ailing.

Climate change is threatening the sustainability of the world's environment. Besides environment, climate change is affecting the livability, health and economy of the globe. In some regions, such as parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades. All these are having a negative impact on the ecosystem where humans live and also on the different plant and animal population which inhabits the earth.

### **Causes of climate change**

- 1) Green house effect:-The presence of carbon dioxide in the atmosphere which helps in trapping the heat from the sun's radiation is becoming thicker and thicker. Adequate amount of carbon dioxide actually keeps the earth temperature at a normal level fit for human and along with it, all plants and animal's existence. However, due to the excessive release of GHG's to the environment by man's activities, the global average surface temperature has increased rapidly in recent years. The carbon dioxide level has increased by 31% in the atmosphere since the pre-industrial times, causing more heat to be trapped in the lower atmosphere. The result is global warming.
- 2) Deforestation:-Large scale cutting of trees for cultivation (slash and burn or jhumming) is also contributing to global warming and hence, to climate change. Forests acts as a huge carbon sink in the environment and therefore, the disappearance of forest adversely affects the environment. Unplanned urbanization and even logging are all contributing factors to the problem of climate change.
- 3) Rapid industrialization:-With the onset of industrialization, there has been a rat-race among many countries to develop their countries. Even the developing countries have joined the race and this is leading to a rapid industrialization process in every part of the world. The environment has always been a waste-bin and at the receiving end. Poisonous gases are released from the factories, to compound to that waste waters, radio-active waste, sewage, economic-poisons like herbicides, fungicides, rodenticides, insecticides, pesticides etc... are all being dumped into the environment which is only enhancing the over-all climate change. The excessive use of fossil fuels, mining, change in land-use pattern and agriculture are all factors that is changing our climate.
- 4) Luxury life-style:-Aeroplanes, refrigerators, air-conditioners, televisions etc... to cite a few have an adverse affect on the environment. On one hand, living is made easy and comfortable but on the other hand the gases released are mostly GHG's. These GHG's enhances greenhouse effect which in turn contribute to climate change.

### Consequences of climate change

As a result of this continuous increase in levels of GHG, our earth is suffering from fever and a sincere effort is required to cure it. Many countries have experienced increases in rainfall, particularly in the countries situated in the mid- and high-latitudes. In some regions, especially in parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades. Episodes of EL NIÑO, which creates great storms, have become more frequent and, persistent and intense since the mid-1970's compared with the previous 100 years. These are all indications that the climate is changing and that the earth's equilibrium due to the imbalances created by human activities is not stable.

A rise in global temperature is causing the rise in sea-levels as polar ice-caps and glaciers are melting along with thermal expansion of water.

The global mean sea-level is projected to rise by 9-88 cm by the year 2100. And to think that more than half of the world's population at present lives within 60 km of the sea only heightens the chance of major disasters that can have catastrophic consequences. The ingress of salt and the rising sea-level will completely annihilate their habitate. Some of the most vulnerable regions according to WHO, 2001, are the Nile delta in Egypt, ganges-brahmaputra delta in Bangladesh and many small islands including the marshal islands and the Maldives.

Because of such changes in the climate, the frequency of floods and EL NINO is likely to increase. There will be fewer of cold spells and more of heat waves. Life lost due to heat-wave in India is on the rise every year. Most of the temperatures recorded in the year 2011, in the cosmopolitan cities has been about 5°C above normal.

The frequent occurrences of floods and droughts will seriously affect the supply of fresh-water. This will in turn reduce the availability of clean water for drinking and washing resulting in spread of infectious disease such as diarrheal diseases. Public health will be hit hard.

Food production will be seriously reduced in vulnerable regions directly and also indirectly through an increase in pests and plant or animal disease. The local reduction in food production would lead to starvation and malnutrition with long-term health consequences, especially for children. Food and water shortages may lead to conflicts in vulnerable regions. Climate change-related impacts on human health could lead to displacement of large number of people, creating environmental refugees and lead to further health issues. All these will seriously affect the economy of the country as well.

Distribution of vector species such as mosquitoes may also be affected, leading to spread of diseases like malaria, dengue, yellow fever and filariasis to new areas which lack strong public health centers.

### Impact of climate change on ecosystem

New research suggests that climate change-induced species decline, in low-diversity Ecosystems, could be more detrimental to ecosystem functioning than species decline in temperate regions, where diversity levels are high. **Low-diversity ecosystems**, such as deserts, cover large areas of Earth's surface; however, few biodiversity studies have examined the impacts of climate change in these areas. In high-diversity ecosystems, several species are thought to perform the same functional role, which suggests that the loss of individual species might not affect the overall functioning of an ecosystem. This so called functional redundancy does not exist in ecosystems where the initial levels of diversity are low, such as polar deserts. Soil ecosystems found in the polar deserts of Antarctica, host simple food webs, with minimal species diversity. Hence, climate change will greatly reduce the functioning of low-diversity ecosystems.

At two locations in the Taylor Valley, Antarctica, researchers have demonstrated that a single species of the soil dwelling nematode, *Scottinema lindsayae*, plays a significant role in carbon cycling. Nematodes are a type of worm, typically just 50  $\mu\text{m}$  in diameter and 1 mm in length. They assimilate carbon into the soil when they feed on plants and other microorganisms in the soil. Between 1993 and 2005, there was a 65 per cent reduction in the abundance of *S. lindsayae*, which the researchers ascribe to regional climate change. Nematodes survive extreme climate conditions by entering into a dry, dormant phase. When the temperatures warm they become active and reproduce. Recent cooling in the Taylor Valley meant that there were fewer days above 0°C, which limited reproduction opportunities within the 218 day life-span of this worm. Researchers stated that the 65 per cent reduction in nematode population was associated with a 32 per cent loss of function in carbon cycling. They also suggested that further declines in the nematode population could elicit increasingly large changes in carbon cycling capabilities. Small changes in temperature (warming or cooling) can have significant influences over soil communities. In Antarctic ecosystems where species diversity and hence functional redundancy is low, ecosystem functioning is dependent on a few 'keystone' species. Loss of these species will have a major effect on food web dynamics and the carbon cycle.

The severity of periodic warming due to El Nino in 1997 in the Pacific Ocean led to the most serious death in coral ever known. It is estimated that about 10% of the earth's coral reefs were dead, 30% were seriously affected and another 30% degraded.

The global coral reef monitoring network transville, Australia, has predicted that all the reefs could be dead by 2050. Climate change impact on the timing of many natural events has been documented for many species. These changes have the potential to affect species population directly or indirectly. According to the IPCC AR4, advanced leafing, flowering and fruiting (3-5 days per  $^{\circ}\text{C}$  temperature rise) are on the rise. Pied flycatcher and macaroni penguin breeding success is likely to be reduced with potential climate induced changes in prey availability. Warming also accelerates spring budburst and delays autumn leaf fall and such changes can have a profound

influence on successional processes and community dynamics which can be devastating for the ecosystem.

### **Climate change and its impact on species diversity**

Climatic change during the quaternary period caused major alterations in biomes and ecosystems across Europe and North America. Yet very few species went totally extinct during this period, other than those restricted to islands or mountain ranges, because the populations of plants and animals were able to migrate according to the changing climatic conditions (Davis 1983). The current situation however, appears to be very different for 2 reasons. First, the rate of climate change may be unprecedented, and many organisms are unlikely to be able to adapt or migrate fast enough. Second, natural habitats are now patchy and isolated, like islands in a developed landscape, and species are often blocked from successful migration.

The earth's biodiversity is undergoing a major, and highly deleterious, simplification as the result of human activities (Wilson 1988). Landscape diversity is often added to the definition (Noss & Cooperluder 1994). Biodiversity at all levels is currently being lost at an unprecedented rate. The world research institute suggests that the current extinction rate is 50-1000 times more than the geo-historical norms. The world conservation union (IUCN) has brought out a startling revelation. Of the 40,117 species examined by it, 16,119 species are in the danger of extinction. This indicates the alarming rate at which species are decreasing year by year. And all this changes are taking place due to climate change.

Just one measure of this loss is the rate of species extinctions. Background extinction rates through geological time have been roughly estimated at the rate of 1 mammal and 2 birds every 400 yrs. (Groombridge 1992). Documented extinctions for the last 400 yr already include 58 mammals and 115 birds (WRI 1994). This is undoubtedly a major underestimate. Highest levels of biodiversity are in the tropics, particularly the tropical forests, and estimates for the total number of species range between 5 and 30 million, less than 2 million of which have been described (Wilson 1988). The top end of this range is based largely on estimates of insect species richness in tropical forests. Current rates of extinction from the tropical forest biome alone have been estimated as between 1 and 11 % per decade-' (Groombridge 1992).

There is a tendency for the issue of species extinctions to gain the greatest attention in any public debate about conservation and biodiversity loss. In fact, ecologists are becoming increasingly concerned with maintaining diversity at all levels, from phenotype to community patchiness and landscape heterogeneity.

Global warming is also leading to an early arrival of butterflies in Britain. Scientists' says that butterflies can now be spotted much earlier every year in the last two decades. Some, like the red admiral, can now be seen a month earlier than was the case in the mid-1970's. Other's like the pea-cock and the orange tip, are appearing between 18-25 days earlier than in the past. Future rise

in temperature is likely to have a detrimental affect on these butterflies. Some butterflies which need cooler temperatures might suffer leading to extinction.

At the poles, the surface water is always colder than the water at the bottom. Hence, warmer water from the bottom rises to the surface along with all the essential nutrients which act as a source of food for the planktons, fishes and other larger animals. The warming of the surface temperature will stop this circulation of water from the bottom to the top and eventually lead to decline in aquatic species population.

Acidification of the ocean due to the formation of carbonic acid will also have a negative impact on the plankton population which is a source of food for many larger animals including salmon. This will lead to decimation of fish population which will again have an impact on the seal population as they primarily depend on fish for their food.

The rise in temperature is also resulting in the melting of the ice-caps on the sea. In 2004, the Arctic Climate Impact Assessment (ACIA) summarized some of the effects of warming temperatures on animals and their habitats in Polar Regions, including parts of Alaska. Polar bears, seals, migratory birds, caribou and reindeer are all experiencing changes that could have dramatic effects on their species and the ecosystems they inhabit (ACIA, 2004).

For example, polar bears are dependent on sea ice to hunt seals and to move from one area to another. Polar bears are unlikely to survive as a species if there is an almost complete loss of summer sea-ice cover, which is projected to occur before the end of this century by some climate models. The seals that polar bears hunt are also unlikely to be able to adapt to an absence of summer sea ice, because they give birth to and nurse their pups on the ice and use it as a place for resting.

In 1987, apiarists in the USA noticed domestic bee hives being infested with small mites. These mites originated in Asia where the native bee population became resistant to them. But it was not the case in the USA. The bee-hives were destroyed in just two weeks by hiding in the cells of the bee larvae and inhibiting the development and also by boring holes in the exoskeleton of adult bees, exposing them to viruses. Such cases of migration and invasion by exotic species to new areas will lead to extinction of many economically important species. An international study of 115 crops grown in over 200 countries showed that 75% of the crops were pollinated by animals especially bees. In U.K. 80% of the crops are pollinated by bees. Disappearance of such species from the earth will have a catastrophic impact on the sustenance of the ecosystem and its inhabitance. Albert Einstein said "if bees were to go extinct, then the earth has only four more hours to live". If we are to go by it, then our earth is in real danger.

Thus, we can understand the magnitude of the impact that climate change can have on the ecosystem as well as the species diversity.

## Conclusion

An inescapable conclusion from the above discussion is that the science of the ecological impacts of climate change should be a fully integrated part of conservation biology. There are many points of contact between the debates about climate change and about ecosystem management, and yet far too few linkages are currently being made. A number of attempts to draw lessons for conservation from assessments of the potential impacts of climate change have been made (e.g. Peters 1985, McNeely 1990, Parsons 1991, Markham et al. 1993, and Turner et al. 1994). But a strong connection has not yet been established. Vitousek (1994) suggested that ecologists need to become more connected with experts in other disciplines and to attempt to cross barriers and help provide a broader understanding of the crucial issues of global change, including climate change, to policymakers and the public. Conservationists tend to strongly emphasize the importance of species protection (Walker 1992) and protected area management, but managing for climate change will require, in addition, greater attention to ecosystem processes and overall land-use patterns. Current conservation management and strategy tend to be characterized by a form of short-termism which acknowledges driving causes of environmental degradation, but fails to take them adequately into account.

Climate change too is often seen as a future problem that is currently insignificant in comparison to more immediate pressures. This results in the development of conservation strategies that will sometimes be in place for decades, but which have not taken future environmental changes, including climate, into account. The gradual shift in priorities in recent years from structurally based, species-oriented conservation to an approach rooted in preserving ecological processes and complexity (Agardy 1994) will require increased attention to the climate issue if it is to be successful.

'Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystems integrity over the long-term' (Grumbine 1994). The long-term goals of ecosystem management will be impossible to achieve if climate change is not considered. Of critical importance, however, is the confluence of interests between the proponents of ecosystem management and those advocating climate change adaptation strategies. Both groups believe it is necessary to create more protected areas, allow for flexible boundary zoning, develop corridor and buffer systems, aim for ecosystem and landscape heterogeneity, reduce human impacts in core zones and pay greater attention to natural succession and transient events (e.g. Peters & Darling 1985, Franklin et al. 1990, McNeely 1990, Markham et al. 1993, Noss & Cooperrider 1994). The political and scientific importance of understanding ecological responses to climate change underlines the need for radical improvement and expansion of biological monitoring

activities. Several recent reviews have proposed improved climate change research programs with strong monitoring components (e.g. Bernabo & Eglinton 1992, Chapin et al. 1992, Kingsolver et al. 1993), but action to implement such recommendations has been slow in coming.

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# FRACTAL GEOMETRY

Bendangwapang  
Asst. Prof, Dept. of Maths

## ABSTRACT

Fractal Geometry is a new branch of mathematics and art. Perhaps this is the reason why most people recognize fractals only as pretty pictures useful as backgrounds on the computer screen or original postcard patterns. But what are they really? Most physical systems of nature and many human artifacts are not regular geometric shapes of the standard geometry derived from Euclid. Fractal geometry offers almost unlimited ways of describing, measuring and predicting these natural phenomena. But is it possible to define the whole world using mathematical equations?

## INTRODUCTION

Many people are fascinated by the beautiful images around them which are termed as fractals. Extending beyond the typical perception of mathematics as a body of complicated, boring formulas, fractal geometry mixes art with mathematics to demonstrate that equations are more than just a collection of numbers. What makes fractals even more interesting is that they are the best existing mathematical descriptions of many natural forms, such as coastlines, mountains or parts of living organisms.

Although fractal geometry is closely connected with computer techniques, some people had worked on fractals long before the invention of computers. Those people were British cartographers, who encountered the problem in measuring the length of Britain coast. The coastline measured on a large scale map was approximately half the length of coastline measured on a detailed map. The closer they looked, the more detailed and longer the coastline became. They did not realize that they had discovered one of the main properties of fractals

### What are Fractals?

The formal mathematical definition of fractal is defined by Benoit Mandelbrot. It says that "a fractal is a set for which the Hausdorff Besicovich dimension strictly exceeds the topological dimension". However, this is a very abstract definition. Generally, we can define "a fractal as a rough or fragmented geometric shape that can be subdivided in parts, each of which is (at least approximately) a reduced-size copy of the whole". Fractals are generally self-similar and independent of scale.

They're everywhere, those bright, weird, beautiful shapes called fractals. But what are they, really? Fractals are geometric figures, just like rectangles, circles and squares, but fractals have special properties that those figures do not have. A fractal is a geometrical object in which an identical motif repeats itself on an ever diminishing scale.

Fractals are amazingly complicated and beautiful shapes that can be produced using seemingly very simple rules, like different hands-on construction methods:

- by using a "continuous process of removals"
- by creating "copies of copies"
- by playing the "chaos game"

With the invention of the computer, the study of fractals has flourished. Computers allow us to continue the self-similarity process of fractals through iteration (repeating a process over and over). This fractal unit will teach you to create fractals by hand and also by using computer software.

## FRACTALS' PROPERTIES

A fractal is a geometric figure or natural object that combines the following characteristics:

- a) Its parts have the same form or structure as the whole, except that they are at a different scale and may be slightly deformed (*Self-similarity*);
- b) Its form is extremely irregular or fragmented, and remains so, whatever the scale of examination;
- c) It contains "distinct elements" whose scales are very varied and cover a large range;
- d) Formation by iteration;
- e) Fractional dimension (*Non-integer Dimension*).

Two of the most important properties of fractals are *self-similarity* and *non-integer dimension*.

What does self-similarity mean? If you look carefully at a fern leaf, you will notice that every little leaf a part of the bigger one has the same shape as the whole fern leaf. You can say that the fern leaf is self-similar. The same is with fractals: you can magnify them many times and after every step you will see the same shape, which is characteristic of that particular fractal.

The non-integer dimension is more difficult to explain. Classical geometry deals with objects of integer dimensions zero dimensional points, one dimensional lines and curves, two dimensional plane figures such as squares and circles, and three dimensional solids such as cubes and spheres. However, many natural phenomena are better described using a dimension between two whole numbers. So while a straight line has a dimension of one, a fractal curve will have a dimension between one and two, depending on how much space it takes up as it twists and

curves. The more the flat fractal fills a plane, the closer it approaches two dimensions. Likewise, a "hilly fractal scene" will reach a dimension somewhere between two and three. So a fractal landscape made up of a large hill covered with tiny mounds would be close to the second dimension, while a rough surface composed of many medium-sized hills would be close to the third dimension.

## THE HISTORY OF FRACTALS

Much of the advanced mathematics that you learn during high school was discovered a long time ago (geometry by Euclid and the Greeks, and algebra by Al-Kwharizmi). A modern day mathematician, Benoit Mandelbrot known as the father of fractal geometry, did learn many key skills from many mathematicians who preceded him, including Cantor (1872), Peano (1890), Hilberight (1891), Koch (1904), Sierpinski (1916), Julia (1918), Hausdorff (1919), and others. Mandelbrot was able to continue the earlier mathematicians' work and create new and beautiful fractals using a recently invented powerful tool: the computer. Mathematicians and scientists are currently discovering new ways of applying these modern fractals to their specific fields.

### TYPE OF FRACTALS

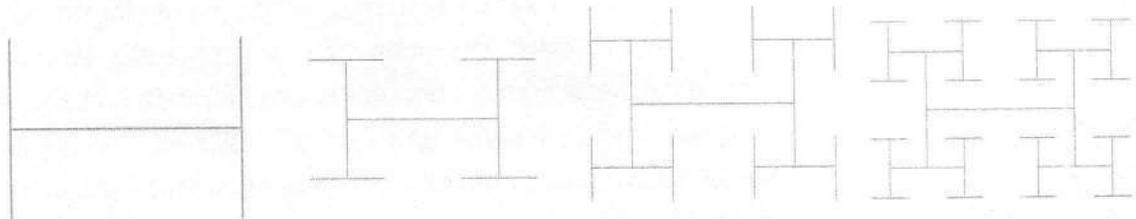
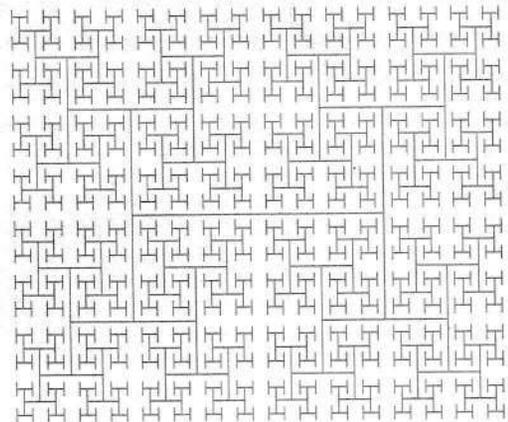
#### Iterated System Fractals

##### The H Fractal

Here are the steps that you will need to follow in order to draw each level of the H fractal.

Step 1: On a large sheet of construction paper we draw a horizontal lines that are 1 foot long to create an H shape

Step2. Continuing this process by attaching another 2 horizontal segments to each of the vertical segments that were created in Step 1 iteratively we get



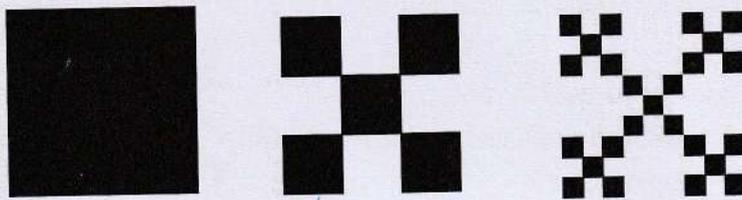
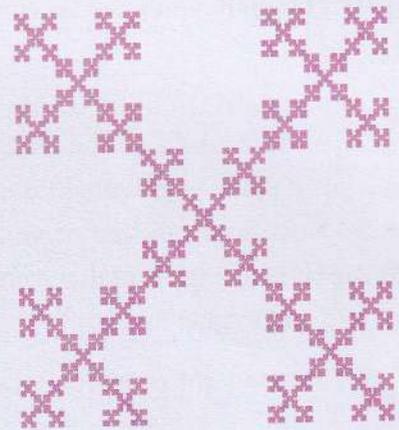
### The Box Fractal

This fractal is made by using the “method of successive removals.”

Step 1. On a large piece of construction paper, we draw a square that has a side length of 1 foot. Shade in the entire square with any colour.

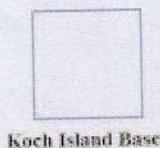
Step 2. Lightly, we draw a square again that has a side length of 1 foot. Lightly divide that square up into 9 smaller squares. Shade in all of the squares except the middle squares on each side. You should have shaded in 5 out of 9 of your squares.

Step 3. Lightly draw a square again that has a side length of 1 foot. Lightly divide that square up into 81 smaller squares. Level 2 drawing had 4 shaded squares in the corners and 1 shaded square in the middle. Copy that drawing except this time do not shade the middle (3x3) squares from each side of the 5 previously shaded squares.

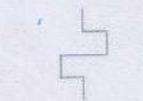


### The Koch Island Fractal

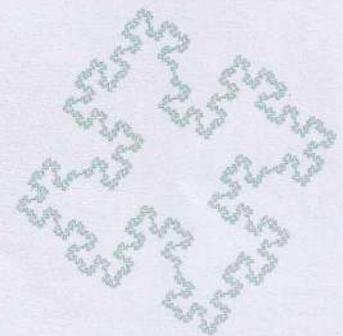
The Koch Island has the following base and motif:



Koch Island Base



Koch Island Motif



This fractal will be completed using the “Copies of Copies” method.

We will copy the motif shape using a “contraction factor” of  $1/4$  (reducing each segment in the Motif shape by  $1/4$ ) and replacing each segment in the current level with the smaller copy of the motif.

Step 1. On a large piece of construction paper, we draw a large square with sides that are 1 foot in length

Step 2. Now, replace all the sides (segments) of your square with the Motif shape. The motif shape has 8 small segments to it

Step 3. Now it gets a little more challenging. Replace each of the small segments from level 2 with the motif shape (smaller version). Each of those segments is  $\frac{1}{4}$  the size of the segments used in the previous level.



### The Sierpinski Carpet Fractal

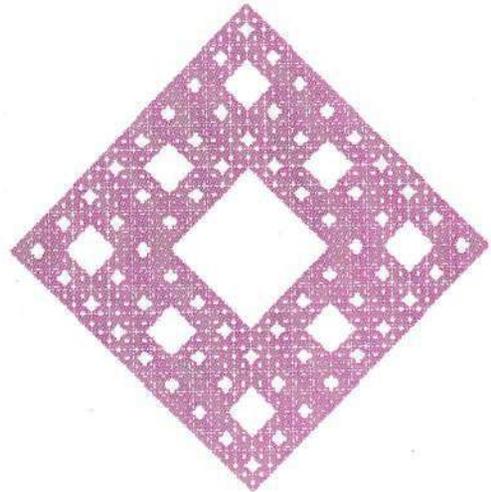
This fractal will be completed using the “method of successive removals” method

Step 1. On grid paper (100 units by 100 units), we draw a square that has a length of 81 units and a width of 81 units. Shade in the entire square.

Step 2. On another piece of grid paper, we draw a square that has the same outline as in level 1 (81 units by 81 units). Think of the square that you have drawn as a square that is made up of 9 smaller squares (27 units by 27 units). Now, shade in all the squares but the middle square. This is the square that we have

“removed.” On the table below, fill in the perimeter and area. The perimeter includes the outside edge of  $4s$  and the inside edge of  $4(\frac{1}{3}s) = \frac{4}{3}s$  for a total perimeter of  $(\frac{16}{3})s$

Step 3. Redrawing the object as in level 2. There are 8 squares that were shaded. Divide each square into 9 smaller squares (9 units by 9 units). Shade in all parts of these squares except the middle square. On the table below, fill in the area and perimeter.



## Complex number fractals

### Mandelbrot set

The Mandelbrot set is the set of points on a complex plain. To build the Mandelbrot set, we have to use an algorithm based on the recursive formula:

$$Z_n = Z_{n-1}^2 + C,$$

separating the points of the complex plane into two categories:

- points inside the Mandelbrot set,
- points outside the Mandelbrot set.

The image below shows a portion of the complex plane. The points of the Mandelbrot set have been coloured black.

By assigning a colour to the points outside the Mandelbrot set. Their colours depend on how many iterations have been required to determine that they are outside the Mandelbrot set.

*How is the Mandelbrot set created?*

To create the Mandelbrot set we have to pick a point ( $C$ ) on the complex plane. The complex number corresponding with this point has the form:  $C = a + b \cdot i$

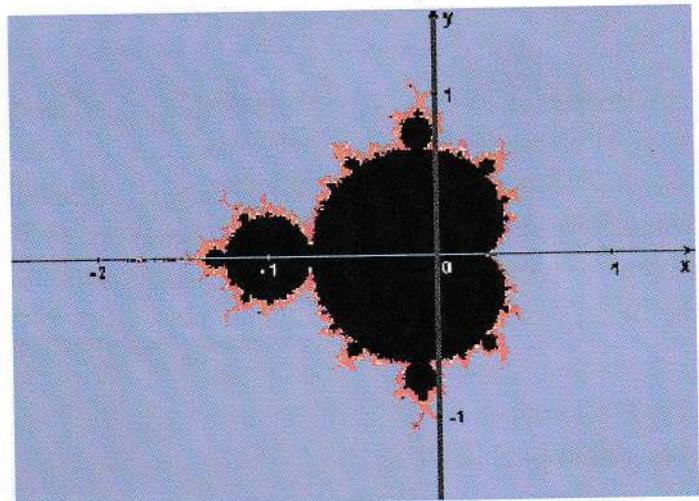
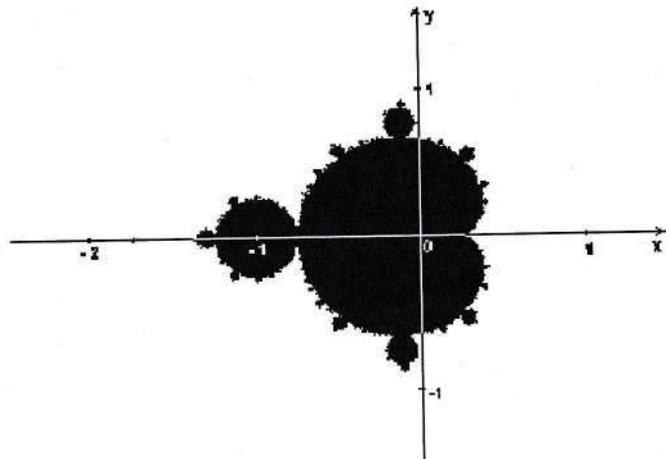
After calculating the value of previous expression:

$$Z_1 = Z_0^2 + C$$

using zero as the value of  $Z_0$ , we obtain  $C$  as the result. The next step consists of assigning the result to  $Z_1$  and repeating the calculation: now the result is the complex number  $C_2 + C$ . Then we

have to assign the value to  $Z_2$  and repeat the process again and again.

This process can be represented as the "migration" of the initial point  $C$  across the plane. What happens to the point when we repeatedly iterate the function? Will it remain near to the



origin or will it go away from it, increasing its distance from the origin without limit? In the first case, we say that  $C$  belongs to the Mandelbrot set (it is one of the black points in the image); otherwise, we say that it goes to infinity and we assign a colour to  $C$  depending on the speed at which the point “escapes” from the origin.

### Julia sets

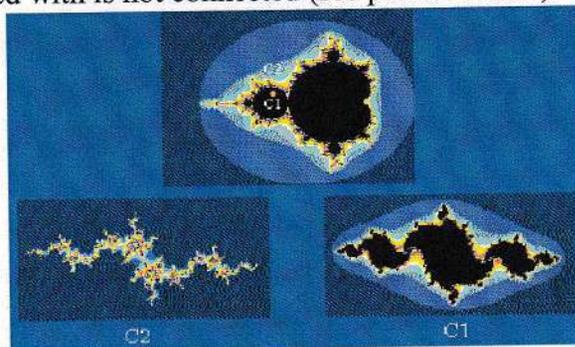
Julia sets are strictly connected with the Mandelbrot set. The iterative function that is used to produce them is the same as for the Mandelbrot set. The only difference is the way this formula is used. In order to draw a picture of the Mandelbrot set, we iterate the formula for each point  $C$  of the complex plane, always starting with  $Z_0 = 0$ . If we want to make a picture of a Julia set,  $C$  must be constant during the whole generation process, while the value of  $Z$  varies. The value of  $C$  determines the shape of the Julia set; in other words, each point of the complex plane is associated with a particular Julia set.

#### *How is a Julia set created?*

We have to pick a point  $C$  on the complex plane. The following algorithm determines whether or not a point on complex plane  $Z$  belongs to the Julia set associated with  $C$ , and determines the color that should be assigned to it. To see if  $Z$  belongs to the set, we have to iterate the function using  $Z_{n+1} = Z_n^2 + C$ . What happens to the initial point  $Z$  when the formula is iterated? Will it remain near to the origin or will it go away from it, increasing its distance from the origin without limit? In the first case, it belongs to the Julia set; otherwise it goes to infinity and we assign a color to  $Z$  depending on the speed the point “escapes” from the origin. To produce an image of the whole Julia set associated with  $C$ , we must repeat this process for all the points  $Z$  whose coordinates are included in this range:

;

The most important relationship between Julia sets and Mandelbrot set is that while the Mandelbrot set is connected (it is a single piece), a Julia set is connected only if it is associated with a point inside the Mandelbrot set. For example: the Julia set associated with  $C_1$  is connected; the Julia set associated with  $C_2$  is not connected (see picture below).



## FRACTALS APPLICATIONS

Fractal geometry has permeated many area of science, such as astrophysics, biological sciences, and has become one of the most important techniques in computer graphics.

### **Fractals in astrophysics**

Nobody really knows how many stars actually glitter in our skies, but have you ever wondered how they were formed and ultimately found their home in the Universe? Astrophysicists believe that the key to this problem is the fractal nature of interstellar gas. Fractal distributions are hierarchical, like smoke trails or billowy clouds in the sky. Turbulence shapes both the clouds in the sky and the clouds in space, giving them an irregular but repetitive pattern that would be impossible to describe without the help of fractal geometry.

### **Fractals in the Biological Sciences**

Biologists have traditionally modelled nature using Euclidean representations of natural objects or series. They represented heartbeats as sine waves, conifer trees as cones, animal habitats as simple areas, and cell membranes as curves or simple surfaces. However, scientists have come to recognize that many natural constructs are better characterized using fractal geometry. Biological systems and processes are typically characterized by many levels of substructure, with the same general pattern repeated in an ever-decreasing cascade.

Scientists discovered that the basic architecture of a chromosome is tree-like; every chromosome consists of many 'mini-chromosomes', and therefore can be treated as fractal. For a human chromosome, for example, a fractal dimension  $D$  equals 2,34 (between the plane and the space dimension).

Self-similarity has been found also in DNA sequences. In the opinion of some biologists fractal properties of DNA can be used to resolve evolutionary relationships in animals.

Perhaps in the future biologists will use the fractal geometry to create comprehensive models of the patterns and processes observed in nature.

### **Fractals in computer graphics**

The biggest use of fractals in everyday live is in computer science. Many image compression schemes use fractal algorithms to compress computer graphics files to less than a quarter of their original size. Computer graphic artists use many fractal forms to create textured landscapes and other intricate models.

## CONCLUSIONS

Many scientists have found that fractal geometry is a powerful tool for uncovering secrets from a wide variety of systems and solving important problems in applied science. The list of known physical fractal systems is long and growing rapidly. Fractals improved our precision in describing and classifying “random” or organic objects, but maybe they are not perfect. Maybe they are just closer to our natural world, not the same as it. Some scientists still believe that true randomness does exist, and no mathematical equation will ever describe it perfectly. So far, there is no way to say who is right and who is wrong.

Perhaps for many people fractals will never represent anything more than beautiful pictures. By now, we have talked about what fractals are, and we used some famous fractals to illustrate how we can create a fractal image. However, fractals are much more than that. The study of fractals has been around longer than you think. Over 100 years ago, the idea of fractals was introduced in mathematical journals and literature. Nevertheless, the study of fractals has never stopped. Even now, the new fractal images are generated everyday around the world. The researchers are still working dedicatedly to find out more about fractals, so that we can make use of them in better ways.

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2. Fractal Unleashed website, <http://library.thinkquest.org/26242/full/>
3. Fractal Geometry Web site, by Michael Frame, Benoit Mandelbrot and Nial Neger at Yale University, <http://classes.yale.edu/Fractals/>

# GREEN CHEMISTRY: THE NEED OF THE DAY

R. Lizonthung Shitiri  
Assistant Professor  
Department of Chemistry

## ***Abstract***

*Green chemistry came into existence more than a decade back and is now becoming very popular. It includes any chemical process or technology that improves the environment and thus our quality of life. Green Chemistry accomplishes both economic and environmental goals simultaneously through the use of sound and fundamental scientific principle.*

## **Introduction: Inception and evolution of Green Chemistry**

The name Green Chemistry was given by T Paul Anastas which means the judicious use of Chemistry for prevention of pollution. The term Green Chemistry, as adopted by the IUPAC working party on Synthetic Pathways and processes in Green Chemistry is defined as "The invention, design and application of chemical products and processes to reduce or to eliminate the use and generation of hazardous substance"

Green Chemistry is given many names- Environmentally Benign, Clean Chemistry, Atom Economy, Benign by Design, Chemistry and Sustainable Chemistry. Green Chemistry was brought in the Chemistry curriculum at the University of Seranton in 1996.

The occurrence of major incidents such as Union -Carbide (Dow) Bhopal disaster, Exxon Valdez oil spill, large scale contamination of the Rhine River, Chernobyl incident (Radioactive material) made the Chemists to make enormous technological methods to deal with the environmental crisis or disaster.

To maintain our standard of living and improve our quality of life, we have come to depend on the products of chemical industry. We are also aware of the hazardous substances used and generated by the chemical process involved. Our environment which is endowed by nature needs to be protected from ever increasing chemical pollution associated with contemporary lifestyles and emerging technologies. Development in water treatment, waste disposal methods, agricultural pesticides and fungicides, polymers material science, detergents, petroleum additives etc. have contributed to the improvement in our quality of life but all these advances comes with a price tag- **pollution.**

### **Sustainability and cleaner production**

1. Combination of technological progress and environmental safety is one of the key challenges of the millennium.
2. Cleaner production has to be identified as a key method for reconciling or balancing environment and economic development.

The basic idea of cleaner production is to increase production efficiency while at the same time eliminate or at least minimize wastes and emissions at their sources rather than treat them at the end of the pipe after they have been generated.

Sustainable development demands change, requires doing more with lesser resources input and less waste generation. Instead of end of pipe technology, it requires pollution prevention policy which is—First and foremost, reduce waste at the origin through improved housekeeping and maintenance and modification in product design, processing and raw material selection. Finally if there is no prevention option possible, treat and safely dispose off the waste.

### **Green Chemistry and Eco efficiency**

In order to move towards sustainable development, chemistry nowadays is at the forefront of the development of cleaner production processes.

Green Chemistry is no doubt determinant to understand and protect our environment as the world's future is strongly dependent on the chemical processes adopted.

It plays an important or integral part of our life and is all around us in the clothes we wear, the food that we eat, the air that we breathe, houses/buildings we live etc.

Sustainable eco-efficiency and Green Chemistry are new principles that are guiding the development of the next generation of products and processes.

It's a comprehensive program to protect human health and environment.

In its essence, Green Chemistry is a science based non-regulatory and economically driven approach to achieving the goals of environmental protection and sustainable development.

In order to be eco-friendly, green organic synthesis must meet some of the following given requirements or conditions: - avoid waste, be atom efficient; avoid use and production of toxic and dangerous chemicals; produce compounds which perform better or equal to the existing ones and are biodegradable; avoid auxiliary substances; reduce energy requirements; use renewable materials; use catalyst rather than stoichiometric reagents which can be easily met by the concept of Green Chemistry. In broad sense Green Chemistry includes chemical processes or technology that improves the environment and thus our quality of life.

### **Twelve principles of Green Chemistry**

There are twelve principles of green chemistry and they were proposed by distinguished chemists Paul Anastas and John Warner. These principles covers all aspects on the product and

production level from prevention to the design of more efficient synthesis, from the design of less hazardous substances to the use of renewable feedstocks. The 12 principles are given below:

1. It is better to prevent waste than treat or clean up waste after it is formed.
2. Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
3. Whenever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and environment.
4. Chemical products should be designed to preserve efficacy of function while reducing toxicity.
5. The use of auxiliary substances (solvent, separation agents etc.) should be made unnecessary whenever possible and when used innocuous.
6. Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure.
7. A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.
8. Unnecessary derivatization (blocking groups, protection/ deprotection, and temporary modification of physical/ chemical processes) should be avoided whenever possible.
9. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
10. Chemical products should be designed so that at the end of their function they do not persist in the environment and instead break down into innocuous degradation products.
11. Analytical methodologies needs to be further developed to allow for real time in-process monitoring and control prior to the formation of hazardous substances.
12. Substances and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents including releases, explosions and fires.

#### **Green Chemistry- The need of the day**

Green Chemistry is a special contribution of chemists to the conditions for sustainable development, incorporating all environmentally benign design approach to all aspects of chemical industry. Sustainable development has become a major economic development and legal and social issues of the country. Green Chemistry has launched the concept of atom economy. The objective is to conduct chemical reaction where all atoms that goes into the process come out either incorporated in the products or marketable side products. It also places special emphasis on the synthesis of new substances and the corresponding industrial process. The use of microorganism for the synthesis of drugs and chemical disposal with the help of genetically manipulated living system has been considered safe.

An inherently safer production process using a biocatalytic approach has been developed which allow generating just the amount of MIC (methyl isocyanate) needed for the conversion into some agrochemical product. Devising waste free process involves the use of solid-state catalyst which in many cases can be chosen so that yield of the commercial product is maximized and undesirable by product is minimized. The change of reactant or a solvent for a reaction to one that is less toxic often by using a different reaction to produce the desired product is nothing but Green Chemistry.

Recycling of wastes is an important dimension of waste management. Food of single cell protein manufactured from refuse, chemicals from cellulose wastes, alternative fermentation products and single call protein (SCP) production have been explored and examined. The strategy called Green Chemistry is reformulation of synthetic routes so that toxic byproducts are not produced in the first place. In other words the new approach is to move up the pipeline towards the point of pollutant creation. Generally, sizing or even eliminating the generation of wastes accomplishes this approach.

### Conclusions

By resorting to appropriate environmental system, integrating the inseparable economics and environmental management we can choose ecologically compatible paths of development. Green Chemistry provides the alternative that the economics need. It may be a time consuming effort but if mass realization about the pertinence of green chemistry is generated, several eco-friendly and safer products and innovative technologies can be developed and designed. Efforts for creating environmental awareness among the mass of people, introduction of Green Chemistry as a part of curriculum in education system and popularization of Green resource materials in the society for their day-to-day use are of great importance.

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## **Observation on the Working of VDB in Nagaland**

Its Working System, Impacts, Problems and Measures

Mr. Vinyühu Lhoungu

Asst. Prof.,

Department of Economics

### **Abstract:**

*Both the central and the state governments have been vigorously involved in the development of rural areas through implementation of various schemes and programmes with the objective of improving socio-economic conditions of the rural poor. The main emphasis is employment generation and infrastructural development. All the activities of the government, especially the Rural Development Department in Nagaland, are implemented through the grass-root level organisation, the "Village Development Boards (VDBs)", which has been active since its inception in 1980. In Nagaland all recognized villages have a VDB to mobilize resources and implement schemes and programmes, the activity of which are determined and selected on the basis of their felt needs. However, it is often noticed that the roles and functions of VDB in the implementation of these schemes and programmes are not fully known to most people and in many cases, to the VDB Management Committee Members themselves. This article is intended to disseminate, in brief, the information to the readers, especially the students, on the working system, its impacts on our village socio-economic conditions, the problems associated with it and finally suggest some corrective measures on the working of VDBs in Nagaland.*

### **Introduction:**

Nagas have a strong community life, inherent emotional attachment to ones own village and also have a vibrant traditional village administrative system. Understanding this rich social capital potential among the Nagas, Padmashree A.M. Gokhale, IAS, the former Chief Secretary of Nagaland, developed the idea of forming an institution based on these favourable social and political heritage and introduced the concept of VDB in 1976. It was first introduced in Ketsapomi village in Phek district in 1976 when he was the Deputy Commissioner of Phek and experimented till 1980. VDBs officially came into existence throughout the state in 1980 with the enactment of "The Village and Area Council Act 1978" empowering the village councils of each recognized village to constitute its own Village Development Board. The institution of VDB thus, became a unique and a very pragmatic practice of decentralized planning. The essence of VDB is

decentralising the power to the hands of the people at the grass root level in matters of economic planning and executing developmental works (at the village level) which has been initiated and is prevalent only in Nagaland. Decentralization, interpreted in simple terms, would mean moving away from the centre or *deconcentration*. In the context of development, decentralization means transfer of certain authority and power in matters of formulation and implementation of developmental plans from the highest organization or institution at the national level or state level to organisations or institutions at the lower level, which includes district, block and village. P. K. Mohapatra, in his work, "Decentralized Planning: A Training Module" (2003), defined Decentralized Planning as, "A type of planning where local organisations and institutions formulate, adopt, execute actions and supervise the plan without interference by the central body".

#### **Composition:**

All permanent residents of a village are members of the VDB and all such members form the General Body of the VDB. Besides the General Body, there is the VDB Management Committee in every village. The members of this committee are chosen by the village council concerned, based on khels, clans or any other considerations. The number of members in the VDB management committee ranges from minimum 5 to maximum 25 depending on the size and population of the village.

Women members in this committee comprises of not less than one-fourth of the total members who take equal part in the decision making-process. Once the members of the VDB management committee are constituted, they elect or select one member as Secretary from amongst themselves who is paid a remuneration ranging from Rs.1000/- to Rs.3000/- per month as may be decided by the VDB concerned, commensurate with their funds. The Deputy Commissioner/ Addl. Deputy Commissioner of the district/ independent sub-divisions is the ex-officio Chairman of all VDB's in the concerned district/ Sub- divisions. The lists of the newly constituted VDB management committee are jointly forwarded by the secretary and village council chairman to the government for approval and accordingly they are appointed by the government for a period of 3 years.

According to clause 8 of the revised Nagaland Village Development Model Rules (2002), no Village Council Chairman or Head G.B. or any Village Administration Head etc., shall be permitted to hold the post of the Secretary of the VDB Management Committee.

The list of VDB numbers in each block headed by Block Development Officer (BDO) and total tax paying households in Nagaland during 2008-2009 are as under:

Sl.No.	Name of District	Name of Block	Total Nos. of VDBs	Total Nos. of tax paying households
1.	Kohima	1. Chiephobozou	27	5517
		2. Jakhama	12	6404
		3. Kohima	15	5478
		4. Tseminyu	32	6944
		<b>Total</b>	<b>86</b>	<b>24,348</b>
2.	Mokokchung	1. Chantonya	20	5865
		2. Kubolong	6	2647
		3. Ongchem	11	1912
		4. Ongpangkong (N)	10	4332
		5. Ongpangkong (S)	7	2806
		6. Mangkolemba	22	5664
	<b>Total</b>	<b>76</b>	<b>23,229</b>	
3.	Tuensang	1. Chare	9	1626
		2. Chessore	12	3442
		3. Longkhim	10	2273
		4. Noksen	10	2024
		5. Noklak	25	5346
		6. Sangsangnyu	20	3777
		7. Shamator	10	2041
		8. Thonoknyu	11	1666
	<b>Total</b>	<b>107</b>	<b>22,195</b>	
4.	Mon	1. Chen	21	6593
		2. Mon	18	3996
		3. Phomching	13	3569
		4. Tobu	16	5731
		5. Tizit	18	3321
		6. Wakching	11	3244
	<b>Total</b>	<b>97</b>	<b>26,454</b>	
5.	Wokha	1. Bhandari	44	2599
		2. Chukitong	10	1610
		3. Sanis	25	4667
		4. Wokha	14	3077
		5. Wozhuro-Ralan	22	2597
	<b>Total</b>	<b>115</b>	<b>14,550</b>	
6.	Zunheboto	1. Akuluto	33	3161
		2. Ghathashi	22	4367
		3. Suruhoto	29	2496
		4. Satakha	36	4201
		5. Tokiye	30	2580
		6. Zunheboto	17	2095
	<b>Total</b>	<b>167</b>	<b>18,900</b>	
7.	Phek	1. Meluri	29	2492
		2. Phek	21	3517
		3. Pfutsero	19	6421
		4. Sekruzu	13	2823
		5. Kikruma	8	4761
	<b>Total</b>	<b>90</b>	<b>21,014</b>	
8.	Dimapur	1. Dhansiripar	28	4142
		2. Kuhuboto	39	3306

Source: A Manual of Rural Development Department. Published by Directorate of Rural Development, Nagaland, Kohima, 2010.

### **Duties and Functions:**

The VDB management committee formulates schemes and programmes of actions for the development and progress of the village. All developmental works for the village as a whole or groups of individuals are carried out by the VDB Management Committee using funds received from the government or community resources. Each VDB operates its funds through the bank accounts which is jointly operated by the chairman of the village council, Project Director, DRDA and secretary of the VDB management committee.

The management committee maintains all the relevant records of the schemes implemented under various government programmes, maintains record on loans issued to the beneficiaries, interest on loans and VDB fixed deposits with the bank and all other financial transactions.

*Meetings:* The general body of the VDB meets twice a year but the VDB management committee meets every month or more frequently depending on the requirements. All such meetings are also open to the other members of the general body. The decision of the meeting is in the form of resolution passed in a regular monthly meeting. 51% of the total number of members in the management committee forms the quorum to pass a resolution in the meeting.

### **Sources of Funds:**

Some of the major sources of funds for the VDBs are the following:

- (i) *Grant – in – Aid:* This is a state government sponsored program under which there is a household allocation of Rs. 1000/- per household in a year for those villages having 67 & above tax-paying households and Rs. 66,000/- per VDB per year for those villages having 66 & below tax-paying households. This fund is directly credited to the accounts of the VDB through the Rural Development Department.

From the total amount received under this grant-in-aid, 20% is set aside as 'Youth Share' which is utilised by the youths (Youth and or Sports Organisation/Association etc.) for the promotion of youth activities, 25% is set aside as 'Women Share' which is also utilised by the women for their common welfare. The rest 55% is the 'General Share' utilised by the VDBs for general welfare. For all these shares, a scheme or project worth the amount of the share is prepared for the ensuing year and submitted to the Block Development Officer (BDO) concerned.

- (ii) *VDB Fixed Deposit:* This is also a state sponsored programme under which each village, irrespective of size and population, deposits a sum of Rs. 2,50,000/- in the bank and the state government gives a Matching-Cash-Grant of another equivalent amount of Rs. 2,50,000/- totalling to Rs. 500,000/- (Rupees five lakh) as VDB fixed deposit for each village. This fixed deposit is primarily to show the existence of VDB in a village. Villagers are not

allowed to withdraw the principle amount but they can draw the accrued interest amount as well as obtain loan against this fixed deposit at the bank's own rate of interest.

(iii) *VDB Welfare Fund*: This also is a state government sponsored programme under which, every year the government deducts Rs. 10,000/- from those villages having 56 and below tax paying households and deducts Rs. 200/- per households for those villages having above 56 paying households, from their grant – in –aid allocation and directly credited to their respective accounts in the bank. Every deposit under this fund is kept in the bank for 5 years and villages are not allowed to draw the principle amount but can draw the accrued interest amount after 5 years.

(iv) *Micro Credit Finance Scheme*: This is a centrally sponsored programme implemented in line with the Corpus Fund. Under this scheme, if a village, irrespective of size and population, deposits a sum of Rs. 40,000/- in a bank, then the state government and central government will give Rs. 100,000/- (Rupees one lakh) each, totalling to Rs. 2,40,000/- (Rupees two lakh forty thousand) which is deposited in the account of the VDB concerned. After the bank acknowledges these deposits in the VDB account, the bank on its part, will extend another equivalent amount, i.e., another Rs. 2,40,000/- (Rupees two lakh forty thousand) totalling to Rs. 4,80,000/- (Rupees four lakh eighty thousand) deposited to the concerned VDB account which is ready for loan purposes.

Under this scheme, the VDBs function as financial intermediaries between the bank and the beneficiaries in the village. Initially the bank extends loans to the VDBs up to Rs. 4,80,000/- but charges interest only on its share, i.e., Rs. 2,40,000/- at the rate of 7% per annum. The VDBs on their part extend loans to the beneficiaries in the village at the interest rate of 15% per annum. Here, out of the total loan amount of Rs. 4,80,000/- taken from the bank, the VDBs repay only 7% interest to the bank for Rs. 2,40,000/- principle and retains the rest 8% interest amount to their fund. But for the other Rs. 2,40,000/- principle, the VDBs retain the whole 15% interest earned to their fund. Under this micro credit finance scheme there is no limit of the loan amount to be extended by the bank. As long as the beneficiaries repay the loan to the VDBs and VDBs in turn repay the bank, then the bank can extend increasing amount of loan to the VDBs.

(v) *Indira Awaaz Yojana (IAY)*: This is also a centrally sponsored programme meant for rural housing. Under this programme the state government through the RD department supplies the Corrugated Galvanized Iron (CGI) sheets to the villagers for construction of houses and up gradation of existing unserviceable kutcha houses according to the wait – list or below poverty line (BPL) list requiring the material as prepared by the VDBs. Each dwelling unit/ household is supplied with 5 bundles of CGI sheets. The reason put forth by the department

for providing only the roofing material is that a house in the village can be constructed with locally available materials except the CGI sheets.

- (vi) *Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)*: A centrally sponsored programme designed as per the National Rural Employment Guarantee Act (NREGA-2005). Initially the Scheme was launched in 200 districts in the country in 2006. Under this Scheme the government provide at least one hundred days of guaranteed wage employment in a financial year to every household in rural areas whose adult members volunteer to do unskilled manual work. In Nagaland this Scheme was launched in 2007 and implemented through the VDBs. All workers are issued a Job Card, the preparation of which is done by VDBs concerned. The wage rate payable to a worker is Rs.100/- per day. Under this scheme, each VDB prepares its own projects and schemes for Annual Action Plan or 5-years perspective plan on priority basis and executes them.
- (vii) *Swarnjayanti Gram Swarozgar Yojana (SGSY)*: A Centrally sponsored programme launched in 1999 with an objective to bring the assisted poor families (Swarozgaris) in rural areas above the poverty line once for all with sustained level of income. Swarozgaris may be individuals or groups. Emphasis is on self help groups (SHGs). The aim is to establish micro-enterprises in rural areas covering all aspects of self-employment, viz. Organisation of the rural poor into SHGs, their capacity building, skill training, planning of activity clusters, infrastructure build up, technology, credit and marketing, revolving funds, etc. Thus, the implementation of this programme requires active combined involvement of the department – DRDA, the banks, VCs and VDBs and the beneficiaries (swarozgaris) – members of SHGs.
- (viii) *Backward Region Grant Fund (BRGF)*: This programme has been introduced by the Ministry of Panchayati Raj in Nagaland during 2007-08. The main objective of the programme is to bridge the critical gaps in local infrastructure and other development requirements that are not being attained nor sufficient with existing Centrally sponsored schemes. The six backward districts in Nagaland fall under the purview of this programme. Under this programme there is a household allocation of funds to the villages on the basis of tax-paying household as in the case of VDB Grant-in-Aid. The VDBs are assigned for planning, implementation and monitoring of schemes according to their felt needs on the line of VDB Grant-in-Aid. However, duplication of schemes with other programmes are to be strictly avoided and no separate youth and women share are admissible under this programme.
- (ix) *Income from community assets and properties*: All Naga villages have some kind of immovable community assets and properties which are inherent for the existence of a village. Whether these assets and properties directly generate regular income, depends on how a

particular village holds those assets. However, with the introduction of VDB in Nagaland, it has largely helped the villages to create and develop community assets and properties like fishery ponds, transportations, forests, commercial buildings, farming (both livestock and cultivations), intermediary services, machineries etc., all of which have become a source of generating regular income.

It is also important to note that besides the sources of funds mentioned above, which comes to the VDBs through the RD department, all the other developmental departments in the state have schemes and programmes for the villagers which in principle should be monitored by the VDBs as intermediaries between the villagers and the departments.

**Achievements and Impacts:** Thirty years of existence of VDB has not only created assets and helped acquire properties, but also significantly changed the life and living standards of the people. Through the VDBs we have not only constructed road connectivity to all the villages but there has also been extensive development of agri-link roads, approach roads, irrigation canals, land development and other basic infrastructures for all kinds of agricultural activities.

With the introduction of VDBs, all thatch houses in most districts in urban as well as rural areas are now being replaced by CGI sheet roofing. Community gathering places like Panchayat Halls, Youth Halls, Playgrounds, and Women Centres have been built. Besides, protection, preservation and promotion of cultural heritage and places of historical importance have been done by the VDBs.

Construction of foot paths, community wells and water ponds, community reservoir for rain water harvesting, construction of school buildings and health centres, marketing sheds, purchase of machineries like rice mills, tractors, loom shuttles, sewing machines, and other masonry and carpentry tools etc., have all made life much easier even in the villages. In several instances, through contribution of free community labour, organized by the VDBs, schemes were completed even when funds allocated were not sufficient to complete the scheme. All these developments through the VDBs has contributed to a paradigm shift in the village life from chronic and unproductive traditional practices to the modern way of progressive and sustainable economic development.

Another commendable achievement is the Declaration of the VDBs as "Financial Intermediaries" or Non-Banking Financial Intermediaries, whereby the VDBs are to take the responsibility of obtaining loans from the banks and account for its disbursal and recovery from the beneficiaries. This innovative venture, if successfully implemented throughout the state, would provide all necessary credit requirements for the economic development of our rural areas.

However, the degree of VDB performance vis-a-vis achievements throughout the state cannot be uniformly generalized. Some of the VDBs have developed into vibrant self-sustaining

or even surplus earning bodies. But at the same time on the other extreme, some VDBs have not been able to perform and are still lagging far behind. It is observed that these differences in the level of performances and achievements from village to village is due to difference in the level of understanding and acceptance that any success and achievement under any schemes are for them and for their own benefit.

#### **Problems:**

VDB is based on the belief that the local community knows best as to where its interest lies and how to achieve them. It was held that the local community should be enabled to take decisions and initiate action with the minimum dependence on higher authorities. Self-reliance and assertiveness are thus, key to such attainment through the VDBs. However, experience shows that there are many problems in the working system of VDBs in Nagaland. The major problems associated with VDBs are the following:

- (i) *It encourages corruption at the lowest level:* Corruption in common understanding means self gain at the cost of the public through unfair means. According to Liberal School of Thought, corruption means 'abuse of public trust for private benefit'. Another school of thought called the Sociological or Moralistic School defines corruption as, "Violation of social norms for private benefit". This definition includes the 'bribe givers' who also violate the social norms. In the midst of unabated practice of corruption in our present society, some people have tried to justify corruption with regards to the working of VDBs in Nagaland saying that, had it not been for the existence of VDBs, money/funds would not have reached the grass-root level. This justification however, does not in any way merit the council chairman or VDB secretary or anybody to abuse public trust for their own benefit. At whatever levels it may be, practice of corruption is the manifestation of lack of integrity.
- (ii) *Conflict between the Village Council and the VDB Management Committee:* There has been persistent cases of conflicts between the two, with regard to exercising absolute power and relative power in discharging their duties and functions. As per the VDB model rules, VDBs are to function under the Village Councils. That is, they are subordinate and accountable to the VCs. However, the powers conferred on the Village Councils by the government for the purpose of formulation of plans and implementations of developmental programmes have been devolved to the VDBs. But the VDBs have to accept responsibility even for those biased decisions affected by the VCs.

In this context, the delegation and devolution of powers to the Village Councils and VDBs respectively by the state government seems to require more streamlining in order to avoid confusions. Devolution of power is different from delegation of power. When power is delegated, the ultimate responsibility still remains with the government. Therefore, in

this case the local authority is still under the control of the government and in every way subordinate to it. Devolution simply means transfer of government powers, functions and resources to local authorities who will be given the power to take decisions and at the same time accept responsibility for those decisions. They cannot shift the responsibility to the government to escape. Thus, in the present arrangement, there is continuous conflict between VCs and VDBs as to the question of who enjoys absolute power (devolved) and who enjoys relative power (delegation) and the contest between the two has resulted in the 'blame game' affecting the developmental process.

- (iii) *Political interference:* In our multi-political party system, every village has one or the other political party affiliation and those in power always have an upper hand in the process of constituting the village council and VDB management committee who in turn influence the process of selection and execution of schemes and projects in the village. This inherent system, in most cases, compromises the efficiency and long term benefits. Political interference even in the process of selection of beneficiaries including BPL categories under various schemes permeates persistent unrest amongst the villagers which hampers social justice and deters inclusive growth.
- (iv) *Differential Village Administration:* Although in principle, VCs and VDBs are democratically elected community bodies and their strength and performances are supposed to depend upon the strength of the community of the village; the heads, or leaders of these bodies in some cases, are clan or family-centred, who may misappropriate the village developmental funds but cannot be questioned by others. This variation, from tribe to tribe or from village to village, in their traditional practices and conventions followed, has posed a serious difficulty in achieving equitable and accountable development.
- (v) *Apathy Towards Role of Women:* According to VDB Model Rules, women members in VDB management committee comprises not less than one-fourth of the total members who take equal part in the decision making process. However, in most cases it is observed that they are deliberately left out by their male counterparts in the decision making process. Their membership exists, in most cases, just to prepare and serve refreshment in the meetings. This apathy towards the role of women may be either due to inherent attitudes of being a male dominated society or putting incapable women members by the men themselves to suit their own interests. The worst part is, women members too easily succumb to the pressures of male members even to divert their share of 25% grant-in-aid to other schemes, which, otherwise, is exclusively meant for the women to utilise for their common welfare.

### Measures:

The basic objective of various VDB schemes and programmes is to create infrastructures, community durable assets, poverty alleviation and uplifting the living condition of the rural people. It is pertinent to question how far this objectives in a particular village has been achieved since the last thirty years of receiving funds (every year) for implementing the various schemes and programmes. In order to make VDBs a vibrant institution so as to achieve the objective of economic self-reliance in all villages, some measures are suggested as under:

- (i) *Sensitization:* Villagers must know what is meant for them; due to them and how much they have in their accounts. Some few influential and self-interested individuals may not be in favour of disclosing the information to their villagers regarding various schemes and programmes or even the financial position of their VDB with the banks. A mandatory display of all these information on the public notice board in a village as enshrined in the VDB Model Rules must be strictly enforced. It is observed that *making mandatory for any government officers, irrespective of departments, visiting a village read the VDB notice board and report his/her observation to the concerned chairman of the VDBs or PD, DRDA* will greatly help/compel villagers in disseminating information amongst themselves. Besides, it is also observed that in most villages another round of mass sensitization on the working system of VDBs is much required though the exercise may be big and strenuous.
- (ii) *Audit and the Resultant Action:* In public finance, auditing is one of the best if not the most effective means to maintain transparency and to check corruption. According to clause 25 section 1. (a) of the VDB Model Rules, compulsory auditing of all VDB accounts shall be conducted once in every financial year. The audit party may comprise of School Teachers, village citizens residing in or outside the village and any 2 district/DRDA/Block level officials who shall be appointed by the DCs concerned. Clause 25 section 2 (b) of the Rule also states that DRDA officials are to conduct spot verification and expenditure audit every six months of atleast 50% of the villages under their respective jurisdiction annually; and section 2 (c) under the same clause states that the state level officials are to conduct spot verification and expenditure audit in 5% of the villages in the state every year. Further, clause 25 section 3 (c) says that audit report of each VDB is to be submitted to the Chairman/DRDA through BDOs for scrutiny and any adverse comments and observation as pointed out by the sanctioning authority be forwarded for the initiation of necessary disciplinary action.

It will not be surprising that in some villages there has not been a single audit conducted all these years. Whereas in some villages, it is observed that villagers appoint auditors by themselves and even in the case of detecting misappropriation or corruption, the action taken is at the most, removal of the culprit from the post or responsibility and in which the lost public money is never recovered. Auditing VDB accounts should be an

effective means to maintain transparency and to check corruption so as to deliver goods to the villagers. Experiences suggest that either the Chairman concerned of the VDBs annually initiate the appointment of auditors for every village from his/her end or empower the VCs to appoint auditors annually by themselves, making mandatory in both cases, to include atleast 1 (one) district/DRDA/Block level official to conduct spot verification and expenditure audit and in case of detecting corruption, stringent action be taken to ensure that public money is recovered. It is also observed that in order to ensure funds been utilised on what it is meant for, concerned department officials should be directed to make more frequent visits to the villages for spot verification of the works done or in progress, and funds be released accordingly.

- (iii) *Use of RTI:* It has been observed that information on the rural development programmes has not reached most people in rural areas. Grass-root level functionaries and common villagers should be sensitised and encouraged to use the Right to Information Act (RTI) which has come into force in the country since Oct. 2005 to bring in transparency and accountability in the working of the public authorities.
- (iv) *Assertive Women Members:* Selection of one-fourth of the VDB Management Committee should be entirely left to the women themselves. In this regard, women too should select from amongst themselves, educated and assertive members who can make their presence felt and take equal part in the decision-making process.
- (v) *Emphasis on Sustainable Income-generating Projects:* Although VDBs are empowered to formulate schemes and programmes of their own, a change in policy guideline directing the VDBs to emphasize more on income generating projects is required. On this count, at least 80% of the funds received from the government should be spent on sustainable income generating projects. This is to ensure that VDBs are empowered to generate their own revenue to reduce their dependence on government. A pertinent question that arises is, 'Can the VDB survive on its own without the help of the government?'. Answer should be a big 'Yes', because thirty (30) years of nurturing and generous support given by the government is long enough for VDBs to stand on its own feet.

#### **Conclusion:**

There is no denying the fact that the VDB has brought about immense improvement in the socio-economic conditions of our rural people. At the same time one also cannot deny the fact that the developmental outcome has not been commensurate with the amount of expenditures incurred. It is observed that a serious retrospective analysis of VDB activities with a focus on full exploitation of our economic potentialities is much required. It is also observed that in spite of receiving equal amount of funds there is wide disparity among the districts in the level of development. On this

count, a district-wise comparative study is required to find out the factors responsible for both successes and failures in the implementation of VDB programmes and suggest measures best suited for the district. In doing so we stand a chance to bring about equitable development in the state.

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## Pharmacognostic Study of Locally Available Plants

Tongpangkokla chang

Assistant Professor

Department of Botany

### Abstract

Drugs of natural origin continue to be important for the treatment of many diseases worldwide. Pharmacognosy, a long-established pharmaceutical science, has played a diverse role in the discovery, characterisation, production and standardisation of these drugs. The relevance of this discipline in terms of research and teaching has increased in the last decade as members of the public in developed countries have turned to the use of herbal remedies for the self-medication of minor diseases. However, many phytomedicines require further investigation for their clinical effectiveness, while others need to be thoroughly investigated for their potential health risks or interactions with prescription drugs.

### Introduction

Pharmacognosy, A subfield of pharmacology which studies natural drugs, including the study of their biological and chemical components, botanical sources, and other characteristics (economic, biochemical, biological, etc.). The word "pharmacognosy" is derived from the Greek words *pharmakon* (drug), and *gnosis* (knowledge). The term "pharmacognosy" was used for the first time by the Austrian physician Schmidt in 1811 and 1815 by Crr. Anotheus Seydler in a work titled *Analecta Pharmacognostica*.

Originally, during the 19th century and the beginning of the 20th century—"pharmacognosy" was used to define the branch of medicine or commodity sciences (*Warenkunde* in German) which deals with drugs in their crude, or unprepared, form. Crude drugs are the dried, unprepared material of plant, animal or mineral origin, used for medicine. The study of these materials under the name *pharmakognosie* was first developed in German-speaking areas of Europe, while other language areas often used the older term *materia medica* taken from the works of Galen and Dioscorides. In German the term *drogenkunde* ("science of crude drugs") is also used synonymously.

The contemporary study of pharmacognosy can be divided into the fields of

- medical ethnobotany: the study of the traditional use of plants for medicinal purposes;
- ethnopharmacology: the study of the pharmacological qualities of traditional medicinal substances;
- the study of phytotherapy (the medicinal use of plant extracts); and

- phytochemistry, the study of chemicals derived from plants (including the identification of new drug candidates derived from plant sources).
- zoopharmacognosy, the process by which animals self-medicate, by selecting and using plants, soils, and insects to treat and prevent disease.
- marine pharmacognosy, the study of chemicals derived from marine organisms.

Pharmacognosy is one of the five major divisions of the pharmaceutical curriculum, represents the oldest branch of the profession of pharmacy. The ancients gathered herbs, animals, plants, and minerals and concocted them into ill-flavored pungent mixtures. Innumerable remedies were known to the early practitioners of pharmacy and medicine, a fact indicated by the writings of Theophrastus, Pliny, Dioscorides, and their contemporaries. Thousands of plant and animal products used for the treatment of ills were described by Dioscorides in his book "De Materia Medica." Of these a surprisingly large number are still of importance in modern therapeutic practice: Aspidium, Cinnamon, Ergot, Ilyoscyamus, and Opium were used in much the same manner as today.

From this humble beginning medicine and pharmacy gradually emerged along separate paths: the physician diagnosing the ailment and prescribing the remedy and the apothecary or pharmacist specializing in the collection, preparation, and compounding of the substance. Thus, the term materia medica (meaning medicinal materials) was synonymous with the substances and products derived from natural sources and employed by the physicians of that era.

#### **Pharmacognosy Embraces a Knowledge of History**

In a broad sense, pharmacognosy embraces a knowledge of the history, distribution, cultivation, collection, selection, preparation, commerce, identification, evaluation, preservation, and use of drugs and economic substances affecting the health of man and other animals. Such economic substances extend beyond the category of crude drugs and their derivatives and include a variety of commercial products: allergens, allergenic extracts, antibiotics, immunizing biological, flavoring agents, condiments, beverages, insecticides, rodenticides, and herbicides. In a restricted sense, the definition of pharmacognosy implies a particular knowledge of methods of identification and evaluation of drugs.

The part of pharmacognosy focusing on use of crude extracts or semi-pure mixtures originating from nature, namely phytotherapy, is probably the best known and also the most debated area in pharmacognosy. Although phytotherapy is sometimes considered as alternative medicine, when critically conducted, it can be considered the scientific study on the effects and clinical use of herbal medicines. constituents are of two types ie active and inert constituents. drug

biosynthesis or biogenesis which is the study of biochemical pathways leading to the formation of secondary constituents is an important aspect of pharmacognosy. The important active constituents are carbohydrates, glycosides, tannins, lipids, volatile oil, resins, oleoresins, gum resins, alkaloids, vitamins, enzymes, proteins etc..

One characteristic of crude drug material is that constituents may have an opposite, moderating or enhancing effect. Hence, the final effect of any crude drug material will be a product of the interactions between the constituents and the effect of each constituent on its own. To effectively study the existence and affect of such interactions, scientific studies must examine the effect that multiple constituents, given concurrently, have on the system.

**Key words:**

Carminative- which expel gases from GI tract

Expectorant- easy removal of cough

Purgative- evacuate the bowel.

Laxative- purgative with mild action

Cathartic- Drastic purgative stools produced are watery in nature

Analgesic- Relieve pain by action on CNS

Antipyretic Analgesic- Reduces elevated body temperature

Diuretic - Rate of formation & excretion of urine

Diaphoretic- Reduce elevated body temperature by increasing rate of sweating

Emetic- produces vomiting

Antipyretic- Reduce body temperature

Hypnotic- Produce sleep

Sedative- Lower activity of any organ/CNS

Oxytocic- contraction of uterus

Anthelmintic- kills or expel worms

Appetizer- Desire for food

Counter irritant- When applied externally causes irritation and reduce the original pain sensation

Stomachic- Increase sensation of gastric juice & function of stomach & digestion

Dyspepsia- indigestion

Antispasmodic- Helps to reduce stomach & intestinal cramping.

Fig.E: Ginseng, the dried roots of *Panax ginseng* (Araliaceae) contains a mixture of Panaxosides, saponin glycosides, Ginsenosides. They are used as tonic, stimulant, and aphrodisiac. It also regulates catabolic and anabolic processes of cells, stimulates immunological function, lowers blood pressure, blood sugar and also inhibits tumor growth.

**Fig.E**



Fig.F: the plant of *Cucurma longa* (Zingiberaceae) possesses a thick tuber-like rhizome with rounded segments having transverse ring-like scars. They are yellow to orange in colour with characteristic odour and slightly bitter taste. Commonly, turmeric is used as a condiment and dye stuff. It is used as antiseptic, expectorant, stomachic, tonic, and blood purifier. Juice of fresh rhizome is used for many skin diseases.

**Fig.F**

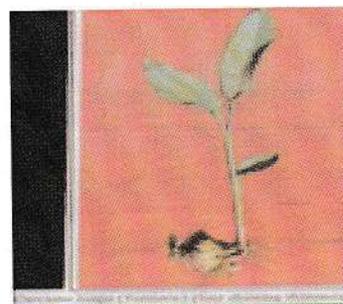


Fig.G: Cinnamon. It is one of the oldest known spices and is the dried bark of *Cinnamomum zeylanicum* (Lauraceae). The leaves are aromatic, dark glossy green above and lighter beneath. The flowers are small, yellow, and inconspicuous. The quills of cinnamon contain volatile oil such as cinnamaldehyde, benzaldehyde, phellandrene, and a sweet substance, mannitol. It is used as a cordial stimulant, in bowel complaints such as dyspepsia, diarrhoea, and vomiting.

**Fig.G**

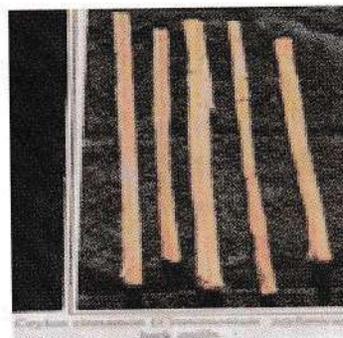
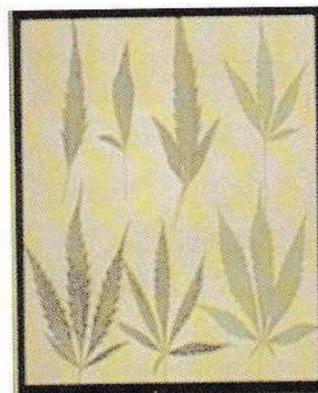


Fig.H; Cannabis. It is commonly known as Marijuana, Ganja, or Indian Hemp. The flowering tops of cultivated pistillate plants of *Cannabis sativa* (Cannabinaceae) are dried for different usage in medicines. The chemical constituents are 10-20% resin which contains active euphoric substance, cannabidiol, cannabidiolic acid. It acts as a sedative, analgesic, and narcotic.

**Fig.H**



### Locally available plants of pharmacognostic importance.

Fig.A: Neem (*Azadirachtha indica*)(Meliaceae)

Parts used: Leaves, flowers and bark

The tree is about 9-12 metres in height. Leaves are dark green, with lanceolate, oblique and serrate shape. The flowers are white with greenish yellow fruits and brownish bark. All these parts have a bitter taste. The chemical constituents found in this plant are azadirachtin, salanin, melantriol, nimbin and margosin. The leaves and oil are used as antiseptic and insecticides. Neem is also used in skin diseases. It is also used as antiviral spermicidal. The flower soaked in water is taken for nervous weakness.

Fig .A



Neem

Fig.B: The common name is opium and its scientific name is *Papaver somniferum*. (Papaveraceae) The plants are annual herbs with large, showy attractive flowers. The fruit is a capsule in which it is dried and the milky exudates is used for medicinal purpose. It has characteristic odour and taste. It contains more than 25 alkaloids and the most important are Codeine, morphine, narcotine, papeverine and thebaine. Opium is used as Central nervous system depressant, hallucinogens, and to control diarrhoea.

Fig.B



Fig.C: It is commonly called peppermint and its scientific name is *Mentha piperita* (Labiatae). It is a herb in which the dried leaves are used. The leaves are dark green in colour, dentate margin which is aromatic and has a pungent smell. It contains 70% l-methanol, menthone, menthofuran. The oil obtained is carminative, stimulant and as a flavouring agent. Mentha oil blocks calcium channel activity and shows smooth muscle relaxant action and is used in irritable bowel syndrome.

Fig.C



Fig.D: It is commonly known as vinca and its scientific name is *Catharanthus roseus* (Apocynaceae). Vinca is an erect, branched herb with simple, petiolate leaves. The flowers are simple and bisexual. Dried whole is used which contains about 60 alkaloids of indole and indoline types. The plant is used as antitumor drug, antidiabetic, hypotensive as well as for Hodgkin's disease and Leukemia.

Fig.D



## CONCLUSION

It is thus obvious that there is a wealth of potential medicines in plants that scientist have only just begun to realise. The study of plants used in traditional medicine in various cultures has yielded important drugs that are critical to modern medicine. While new compounds are being rediscovered in medicinal plants, one can only wonder about potential drugs that have not been discovered. Plants thus hold the key that will unlock the secrets to many other important potent drugs. We must use our wisdom and foresight to preserve and protect these precious plant resources for the present and future generation Carolus Linnaeus, 16<sup>th</sup> century Swedish botanist, rightly observed."Herbs and Plants are medical jewels gracing the woods, fields and lanes, which few eyes see, and few minds understand. Through this want of observation and knowledge, the world suffers immense loss.

Study of medicinal plants is an on-going human endeavour. Research on nature, bioactive compounds and their isolation will continue to play a pivotal role for centuries to come not only for their commercial exploitation, utilisation as drugs and allied product but for better health of human beings the world over.

Humankind's quest for better Medicines (bio-prospecting for molecules of therapeutic value) will continue, since today's medicines finance tomorrow's miracles. Future, pharma companies link innovation directly to its revenue. Judging by the current trends it is estimated that by 2050, plant-based drugs will have a market potential of US \$5 trillion.

The most effective is to perform multidisciplinary work on the development of drugs from plants, a task that can only be effectively tackled by collaboration between botanist, ethnobotanist, pharmacognist, phytochemists, biologist, pharmacologist and medical doctor (HOSTETTMAN and MARSTON. 2002)

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# PROGRESS AND DEVELOPMENT OF EDUCATION IN AO AREA

Ms. Temjentula

Assistant Professor

Dept. of Education

## Abstract

This paper discusses about the Ao Nagas known as the most advanced tribe among the Nagas progressed and developed educationally before the advent of Christian missionaries on its land. The important institutions of informal system of education like the family, the Morung transformed their social life serving as an agency for all round socialization and all round development of their personalities, cultures and vocations making them fit to live as contributing member in the sovereign village state.

## Introduction

Western education in Nagaland was first introduced by the American Baptist missionaries. Though they came into contact with the Nagas in the later part of the 18300, it was only in the 1872 that they could make an inroad into the Naga Hills. The American Baptist missionaries who were the harbingers of western education did a commendable job in the field of education. Prior to their arrival, there was no formal schooling. It was purely informal. The aim of education was neither for a profession nor a professionally-oriented system. It was purely to train young children to be perfect, well-disciplined citizens and to fully equip themselves with the knowledge of the customs and traditional practices. Hence, education simply implied the acquisition of those qualities and traits that made an individual into a responsible person and observed all the norms of society. Generally, there were three agencies that imparted informal education- the family, the Arju (Boys' Dormitory) and Tzukitem (the Girls' Dormitory).

## EDUCATIONAL SYSTEM BEFORE INTRODUCTION OF FORMAL EDUCATION

Since time immemorial, the Nagas were extremely superstitious and independent of religious pre-possessions. It was therefore very difficult for the British officials to control the uncontrolled people. When the British authority established its authority over the Hills in the missionaries approached the British authority to allow them to carry out missionary activities.

In the meantime, David Scott, the first Commissioner of Assam, was of the opinion that "rude tribes were more likely to profit by the teachings of the Gospel". Major Francis Jenkins, Agent to the Governor-general, North East Frontier, from his intimate knowledge of the Naga tribes, became convinced that "the savage head hunters could not be raised to the standard of civilization unless they were redeemed from their primitive ways of life by spreading Christianity and education"

The request of the missionaries to carry out missionary activities in the then Naga Hills was looked down by the British administration on some grounds but later, when they faced problems and opposition from the Nagas, they decided to give a free hand to the missionaries to control the Nagas and to carry out social work without the expense of the Government. Francis Jenkins therefore invited the American Baptist Mission Society to work in the Naga Hills, Garo hills and the Assam Valley assuring all possible official and personal help. The missionaries were glad to accept the invitation and saw in it the prospect of winning the hill tribes of the Assam Frontier to the cross.

In the early times, informal education was imparted and transmitted through oral communication only. Having no written script record their knowledge occurred over the centuries. Learning of one's customs, traditions, culture and skill was passed down orally from generation to generation i.e. from elder to younger members of the society. This indigenous system of education prevailed among the tribal population inhabiting in other northeast regions of India. The family, village community and "Morung" or "Ariju" in Ao dialect were the important institutions of informal system of education. Another important institution of informal education for girls was the "Tzukitem" known as the Girls' Dormitory.

#### **(i) FAMILY:-**

For the Ao Nagas, the first families were started at Chugliyimti which was and is still regarded as pure and sacred. The Ao family consists of father, mother and the children. Single family norm was dominant opposed to joint family system. It was from here that children started to learn social lessons. Parents and elders of the family took the place of teachers and shared major responsibilities for the children's' education at home. Most of the lessons related to agriculture, weaving, singing, making wine, behavior, discipline like how to help others and how to escape from the hands of enemies etc. were taught by the parents in their families.

#### **(ii) MORUNG/ARIJU:**

Ariju means 'to fight with the enemy'. An Ariju is a traditional institution where young boys from the age of normally 15 years to the time of their marriage went to study and prepared themselves with all necessary qualifications to relate to their own self defence. It is a dormitory for the young unmarried men, serving as an agency for all round socialization and makes him fit to become a worthy citizen of the village. Morung serves as a guard house, recreation club and centre of education, art and discipline and have its own importance for ceremonial purposes. All the young boys as soon as they reach puberty were compulsorily sent to the Morung and they had to sleep there till they were married. Morung played an important role in educating the young boys about various arts ranging from basket making and wood carvings to weapons and implements to protect themselves from enemies, cutting

and splitting of bamboos for making various types of handicraft was done in summer and the collection of materials for making various types of handles during autumn.

Thus, to the Nagas, the morung was the most effective and the most important agency for socialization of a man for the all round development of his personality, culture and vocations and made him fit to live as contributing member in the sovereign village state.

### **(iii) Tzukitem (Girls' Dormitory )**

As the Arijus served to train the boys in different disciplines. There was also a similar institutional counterpart for the girls known as the Tzukitem. This institution is as old as the Ariju. The Tzuki can be translated as the girls' dormitory and the girls sleeping in such a dormitory were called 'Tzukir'. The dormitory would always be established in the house of a widow who served as a nation to the girls rooming in her house. She was known as the Tsukibutsula. The dormitory is an important socializing agency and training centre for motherhood. The young girls were taught and trained in various vocations, arts, discipline manners etc. so that they are able to shoulder the motherly responsibilities and become a good citizen of the village state. Various types of handicraft like weaving, embroidery, design works etc. were taught to the girls at the dormitories at night. The most important value of this agency lay in the molding of the girls' future, building up their character and facilitating selection of the right partners too.

Thus, in the process of growth and development, involving all the social, political and economic aspects, the Ariju and Tzukitem as well as the family served as the best instructional institutions in Ao society from time immemorial.

### **Beginning of formal Education:**

Formal education in Nagaland is a recent Development .It can be traced back to 1878. It was Rev. Edward Winter Clark and his wife Mrs. Mary Mead Clark who opened the first formal school at Molungyimsen Village. It was a school for girls with six students on enrolment. It happened to be the first educational institution established in Ao soil and it took deep roots. It was at this village that Rev. E.W. Clark established a mission field. Early in March 1878, Dr. Clark was joined by his wife at Molungyimsen and Mrs. Clark took rendered valuable service in school work and in other areas". The first batch of the pupils were "Tongpangkoka, Noksangkla, Jongmayangla, Purla, Punayula, Taripisu". But the school faced problems firstly with appointment of a Christian teacher and the text book to be used in the school and secondly, the script to be used and the medium of instruction. Dr. Clark thought of adopting Assamese as the medium of instruction but he changed his mind and decided to use the Roman script. He therefore took recourse to the use of Roman alphabets as the Nagas had no written

literature of their own. He made use of cardboard cuttings for the 26 letters. While Dr. Clark entrusted his wife to concentrate on the school and its administration, he fully occupied himself in literary work.

Now, when the students assembled for study, she brought the 26 letters in a basket and distributed among them and taught them to read. When they had learnt to read and write properly, she proceeded to the Bible and used it as a text book. She also awarded them necklace, pictures and clothes and likewise motivated them to be sincere and regular in their class. Besides this, she also taught them some gospel hymns like "We are marching", "Bringing in the sheaves", "My faith looks up to thee".

Dr. Clark realized that education was one of the most important weapons to evangelize the Nagas. To realize its goal, He opened schools in the villages. Some of the villages where a church was founded and mission school was started were "Merangkong, Wameken, Yajang, Akhoia, Lirmen, etc". Dr. Clark also brought some Assamese teachers namely, Nath Barker, Benjamin Symon, Hutton, Livi Evans, Livi Farewell etc" and deputed them to mission Schools. All of them were Christian and were Baptized while working in the mission schools. By 1889, a former pupil of Mrs. Clark served as a day school teacher at Yajang. The village schools were the chief means by which the pioneer missionaries tried to give education of any kind to the Nagas.

On 4<sup>th</sup> October 1894, the mission center was shifted to Impur as it is the center of Ao land geographically. The idea of Dr. Clark to open Impur as mission center was to bring more Nagas to Impur School to educate them along with the teaching of Christ.

In 1898, a station training school was opened by Rev. S. A. Perrine at Impur with nine pupils". This station training school prepared young men for pastors, evangelist and school teachers and young women to be suitable wives for such men. The young boys and girls from different parts of Ao, Sema and Lotha area flocked for study to the new training school. By 1899, there were 40 students in the stations training school. In addition to this, there were eight day village schools in the Ao area with an enrolment of 200 students.

It is interesting to note that the Ao students conference held at Longkhum village in 1929 resolved to request the government to open at least one school in every Ao village. By 1931 there were 52 primary schools in Ao area.

The Nagas became aware of the vast positive changes that were made possible through education. Thus, parents who could effort sent their children to different places to acquire education. In spite of the marked progress in education, there was no Institution of higher learning in Nagaland till 1959 due to certain reasons, political and social. The need for having a college was felt since the early nineteen fifties but it could not materialize because. in the midst of political and social turmoil, bringing forth the agenda of establishing a college seemed odd. Therefore, students who passed their matriculation

examination went to distant places like Gauhati, Shillong and Calcutta for higher studies. But many students could not afford this. Seeing the immediate need of having a college, in 1958, a few natives who had received college and university education made a concerted attempt to open a college in Mokokchung. Thus on 8<sup>th</sup> September 1959, the first college in Nagaland was started in Mokokchung. As Nagaland was still a part of Assam state, the then NHTA (Naga Hills Tuensang Area), the Steering Committee agreed among its members to name the college after the then Governor of Assam, Syed Fazl Ali. Subsequent to his Excellency's consent, the first college in Nagaland came to be called by the name Fazl Ali. The college was affiliated to the Gauhati University but with the establishment of the North-Eastern Hill University (NEHU), the college became an affiliated college of NEHU in 1973 and later on to Nagaland University on 6<sup>th</sup> September 1994.

In 1972, a Theological college was started at Impur by Ao Baptist Arogo Mongdang (ABAM) which was later shifted to Aolijen. The college was named after the first American missionary, Rev. Dr. E.W. Clark. It is affiliated to Serampore University.

To meet the aspirations of the people, a Law College was opened in 1981 in Mokokchung town with an enrolment of 71 students. Another Arts College called People's College was also started in 1984 by Naga Scholars Society. Consciousness of Ao people about education had given rise to increase in the number of schools. This led to substantial increase in literacy rate in Mokokchung district. In 1981 Census, the literacy in Mokokchung district was 61.78 % whereas in 1991 Census it was increased to 68.54% and in 2001 Census, it increased to 84.78%. Thus the development of education grew day by day in Ao area.

#### **CHANGES IN THE EDUCATIONAL SYSTEM AFTER INTRODUCTION OF FORMAL EDUCATION**

After the introduction of the formal education in Ao areas marked changes have been observed in their thinking, awareness, skill behaviors and life style. The educated men and women were more conscious of the privileges and responsibilities as a citizen than their counterpart uneducated and illiterate men and women. As a result of the speed of education among the Ao people, people were conscious about their personal hygiene, health, marriage, education, employment avenues and guidance of the younger generation, better clothing and food habits and higher acquirement of education.

As a result of the impact of education, the educated parents reported about the type of education they prefer for their children. The parents were of the opinion that education needs to be given according to the aptitude and interest of the children. Thus the parents today are more conscious about the choice of the type of education for their children.

Proper use of textbooks and learning manuals were developed, students learnt to be more discipline and well behave. Students learnt to respect their teachers as well as their parents and also community in general. Various developments took place in schools as well as in the community.

People were eager to learn more and explore new facts and knowledge, as a result of education, people became more aware around them and developed healthy attitude towards fellow beings. They learnt to be more tolerant to people outside their society and accept the social, economic and cultural changes.

Education initiated a new thinking, process from national to notional thinking. Need for qualified teachers rose up and thus, only qualified and experienced teachers were needed to teach the younger students. Thus, better knowledge and skills were introduced and thus, development took place not only educationally but also socially.

Thus, after the introduction of formal education, the educational systems tend to change from darkness of light. Ignorance to civilization and illiterate to literate state of life.

#### **Some major educational problems**

1. Wastage and stagnation at all levels of education.
2. Universalization of elementary education not yet achieved.
3. Political interference in institutional administration, appointment and transfer of teachers.
4. The ratios of the teachers are not proportionate among the urban and rural areas.
5. Mushroom growth of private schools.

#### **SUGGESTIONS AND MEASURES TO IMPROVE THE EDUCATIONAL SYSTEM**

1. There is need to be more emphasis on education for all sections of the community particularly consulted efforts are required for education in backward areas.
2. The present system is too bookish and narrow in its objectives without proper guidelines for vocational preparation. There need to have emphasis on vocational and job-oriented education including practical activities suited to the needs of the learner and society leading to self-sufficiency.
3. The subject content is too vast without any dept, which put undesirable pressure on students and arrest their creative thinking abilities. Therefore, there is an urgent need to improve the existing syllabi at primary, elementary and higher school levels as well as tertiary education level.

4. Well-qualified teachers should be appointed at all stages of education.
5. Use of educational technology can improve the classroom instructional process.
6. Teaching facilities as well as school facilities should be given enough.
7. The process of vocationalization of education at 10+2 level and degree level requires to be accelerated for developing skills and competency among the students for a specific trade.

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# RISE OF OMBUDSMAN AND ITS PROSPECTS IN INDIA

**Dr. Amitava Paul**  
Associate Professor  
Department of Political Science

## ABSTRACT

The institution of Ombudsman originated first in Scandinavian countries. Ombudsman means an independent officer who investigates complaints against the public organizations. In India the institution came in different forms like C B I and C V C. Since 1962 several committees were formed in India to recommend for the setting up of ombudsman-like institutions and subsequently several times Lokpal bill was introduced in parliament but never enacted. However, some of the state governments enacted the law for the creation of Lokayukta. The working of these institutions was never satisfactory. In the absence of effective ombudsman, many high level corruption cases raised their ugly heads. Recently an anti-corruption movement led by social activist Anna Hazare and his team had shaken the whole country which received massive public support. The team of Anna Hazare drafted a Jan Lokpal Bill which they wanted to get passed by the parliament but a serious difference with the government started as they had their own version of Lokpal bill.

The present paper highlights the salient features of the Jan Lokpal, how it does particularly differ with the government version of the Lokpal bill and also the movement of the Anna team that developed till September 2011. In the concluding observation the writer raised hope for the emergence of an upright and effective ombudsman despite doubts aired at some corners.

## INTRODUCTION

The institution of ombudsman is typically Scandinavian. It has been in existence in Sweden since 1809 and in Finland since 1919. Several countries of the world have since have adopted the ombudsman like institutions.

Ombudsman is a Swedish word, stands for 'an officer appointed by the legislature to handle complaints against administrative and judicial action'. In other words, an ombudsman is someone who investigates complaints made by people against the government or any public organization. He is an independent official who represents the common man.

## OMBUDSMAN IN INDIA

The need for institutions to deal with corruption and citizens' grievances has been keenly felt in India and consequently many ombudsmen like institutions were created. The Indian version

of ombudsman is appeared in the form of Lokpal, Lokayukta, Upalokayukta, Jana Lokpal, C V C, C B I and others.

### **DEVELOPMENTS IN INDIA**

In April 1963 the C B I was created. Over the years it was build upon the image of professionalism and integrity. The services of its investigating officers were sought for all major investigations.

In 1962, Santhanam committee was constituted and on the recommendation of the Committee the Central Vigilance commission (CVC) was setup in 1964 and vigilance cells were created in several government departments later. The Commission receives complaints directly from aggrieved persons. Its jurisdiction is limited to complaints against gazetted officers and its equivalent.

In 1966, Administrative Reforms Commission (ARC) was set up to take up the matter of redress of citizen's grievances. The commission felt that the existing institutions to deal with the problems of corruption were inadequate and stressed that effective 'Ombudsman' an essential prerequisite of the progress and prosperity of the country.

The ARC recommended a two-tier machinery of Lokpal and Lokayukta for redressal of citizen's grievances. Lokpal would deal with the complaints against ministers and secretaries in the central as well as state governments. The Lokayukta, one at the centre and one in each state would attend complaints against the rest of the bureaucracy.

The legislation for the institution of Lokpal and Lokayukta were introduced in Parliament in 1968. The bill was passed by the Lok Sabha in 1969. It was however lapsed as parliament was dissolved before it could be passed by the Rajya Sabha and receives president's signature. The bill was again introduced in 1971, 1977 and in 2005. All efforts were lapsed and so far not enacted.

### **OMBUDSMAN AT STATE LEVEL**

Some of the states in Indian have set up ombudsman like agencies .Orissa was the first state to present a bill for its establishment in 1970. However, Maharashtra is the first state to have established the institution in 1972. Thereafter, this institution was established in different states in different years, namely, Rajasthan (1973); Bihar(1974); U P (1977); M P (1981) AndhraPradesh(1983); Himachal Pradesh(1983); Karnataka(1984); Assam(1986); Gujarat(1988); Delhi(1995); Haryana(2004).

## WORKING OF THE INSTITUTIONS

Not much publicity seems to have given to the working of these institutions. The structure of Lokayukta is not uniform across all the states. The Lokayukta does not have *suo moto* powers of initiating an enquiry. As long as these institutions serve as an extension of the bureaucratic apparatus of the government and influenced by the overpowering ministers and political forces, it shall not be able to give desired results. Corruption in public life has again and again come for discussion as the problems remain largely unresolved. The vigilance commission or C B I is certainly not a substitute for an ombudsman in strict sense. The people of India are definitely seeking for ombudsman machinery which shall be simple, speedy and cheap method of handling citizen's grievances.

## CURRENT MOVEMENT

It is against this background of prevalent inefficiency in government that usefulness of existing ombudsman system in India has been called in question. In the recent months (April 2001-September 2001) a movement called "India Against Corruption" led by social activist Anna Hazare has been started. He led the movement for passing a stronger anti-corruption Lokpal (ombudsman) bill in the parliament. The movement gathered a significant amount of support from India's youth which was vivid on the social networking sites like Facebook and Twitter. The argument and support for the movement is centered round a number of corruption cases causing huge loss of country's exchequer and national prestige. India though being considered as one of the top three economies of the world sinks to number 87 due to widespread corruption in government departments. This movement has been described as an expression of the collective anger of people of India against corruption. When the support to the movement spread across the whole country the people of Nagaland also expressed their solidarity to the movement which they have endorsed by way of candle light procession in some towns.

## DRAFT BILL OF ANNA HAZARE AND ITS FEATURES

In order to bring out an efficient and effective ombudsman in India Anna Hazare team drafted the JAN LOKPAL BILL (or citizen's Ombudsman Bill). Its salient runs like this:

1. An institution called LOKPAL at the centre and LOKYUKTA in each state shall be set up.
2. Like Supreme Court and Election commission, they will be completely independent of the government.
3. Cases against corrupt person will not linger for years. Investigation to be completed in one year and trial should be completed in the next year. The corrupt person (politicians, judges, ministers or officers) to be sent to jail within two years.

4. The loss that the corrupt person caused will be recovered at the time of conviction.
5. If a citizen's work is not done in prescribed time limit in any government office, Lokpal will impose financial penalty on guilty officers who will be given as compensation to the complainant.
6. The officials of the Lokpal shall be selected by judges, citizens and constitutional authorities and not by politicians.
7. Any person can report any case of corruption.
8. The existing anti-corruption agencies like C V C, all departmental vigilance commissions and anti-corruption branch of C B I will be merged in tom Lokpal
9. Any complaint against any officers of the Lokpal shall be investigated and officers dismissed within two months.
10. Whistleblowers shall be protected. Those who are being victimized for raising their voice against corruption shall be protected.

#### **GOVERNMENT LOKPAL AND JAN LOKPAL: DIFFERENCES**

The government of India had its own version of Lokpal bill that they drafted. The government's bill was introduced in the August'11 session of parliament. It created serious differences between the two bills. Team Anna went to the extent of calling the government's version of bill as JOKE PAL BILL.

#### **TABLE SHOWING THE POINTS OF DIFFERENCES**

<b>JAN LOKPAL BILL</b>	<b>GOVT. LOKPAL BILL</b>
Lokpal to take <i>suo moto</i> action or receive complaints from general public.	No <i>suo moto</i> power of Lokpal. It can prove complaints forwarded by Speaker or Chairman of Houses of parliament.
Power to initiate prosecution of anyone found guilty.	To act only as an advisory body and forward report to 'competent authority'
Lokpal and anti-corruption wing of the C B I will be one independent body.	Lokpal and C B I will be unconnected.
Punishment will be for minimum of 10 years and maximum up to life imprisonment.	Minimum punishment for 6 months and maximum up to 7 years.

## DIFFERENCES ON SPECIFIC ISSUES

ISSUES	JAN LOKPAL	GOVT. LOKPAL
P.M	Can investigate With permission of 7 members of Lokpal bench.	Can be investigated only after he vacates his office.
Judiciary	Same as above	Judiciary is exempted and to be covered by a separate bill
M P s	Same as above	Investigation can be done but their conduct in the parliament cannot be investigated.
Bureaucracy	All public servants would be included.	Only a Group 'A' officers would be covered
Removal of Lokpal Members	Any person can bring a complaint direct to the supreme court.	Only aggrieved person can raise complaint direct to the president of India.
Whistleblower	To be protected.	No protection can be granted.
Punishment	Can either directly impose penalties or refer the matter to Courts.	Cannot take any punitive actions. Only can refer the matter to the courts.
N G Os	N G Os not within the jurisdiction of Lokpal.	N G Os to be within the jurisdiction.
Removal of Staff	To be handled by independent Boards in each state.	Lokpal itself will conduct inquiries in to its own behavior.
Scope	All corruptions to be investigated.	Only high level corruption cases can be investigated.

## CONCLUDING OBSERVATIONS

The institutional devices available round the world to deal with redress of citizen's grievances are many and varied. So far India is concerned, several institutional experiments have been made at different levels but the problem remains largely unresolved. Dissatisfaction with the governmental operations is fairly widespread. The present machinery is faulty, slow-moving and corrupt.

The Anna movement and the mass support that it received is an indication of public anger and consciousness over the issue. Many are of the opinion that the proposed Jan Lokpal Bill may not be a permanent cure against corruption but an independent, credible and empowered Lokpal is a necessary condition to effectively control corruption and redress citizen's grievances. It may not be easy but the recent uprising has provided a ray of hope. There is every possibility that Jana Lokpal shall not languish for long and it shall see its light soon in the form of a law to provide better life to all citizens of the country. The battle must go on and let us work at least to put that in place.

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**Abstract**

*Despair in literature has two manifestations in life—positive despair and negative despair. When we talk about despair in the life of Kamla Das, it is of the positive kind. She passes through the heat of passion to purgation- spiritual purification. Her references to the body or the sex-instincts carry her to knowledge beyond the body.*

*The Old Playhouse and Other Poems (1973) shows Kamla Das at her best because the poems in this volume are richer than her early poems both in meaning and matrix. While the theme of constituting nature of love, lust and frustration continues, the deeper meaning is expressed in the treatment of subjects like life and death, disease and decay. Kamla Das grows wiser after penning the two volumes of her poetry. So long as she pursued the worldly aims- her marriage, her golden dreams of setting down with Carlo, a foreigner, she found everything slipping out of her hand. But her realization of the mundane existence has made her serious about life. What is most remarkable in the poem 'After the Illness' is that there is no death after illness, but a re-awakening into the surprising state where the lover looks beyond the beloved's body. Other poems also revolve around the similar theme.*

*As a perfect feminine voice, Kamla Das has shown the readers every nook and corner of the female's heart. Her honesty has certainly cast a deep effect on her readers. As she advances in age, she comes to realize the ultimate truth of the world. Her love cries seem to have purged her of all physical desire. This is why she could transfer her devotion to Lord Krishna. Indeed, the Radha-Krishna myth has filled the poetry of Das with spiritual yearning for melting into the divine. Her seriousness about the loss of the soul in the materialistic world is a metaphysical quest, a spiritual cry born out of despair.*

*Despair in literature has two manifestations in life—positive despair and negative one. Negative despair means a total helplessness and darkness unrelieved by the slightest ray of light. Under the spell of such circumstances, one may go up to the extent of committing suicide. In the event of positive despair, one keeps on probing into the depth of darkness. It may be a complete immersion in the destructive element leading to a true self-realization. It is not an end in itself, but a means to an end and the end is the reconstruction of a new life out of the ruins of the old. When we talk about the spiritual despair, we also mean that Kamla Das' despair of a positive kind. She passes through the heat of passion to purgation- spiritual purification. Her references to the body or the sex-instincts carry her to knowledge beyond the body. Her knowledge of the body generates a new awareness in her. She is an insatiate soul,*

which longs for earth's utmost bitter, utmost sweet. Her intricate love of love and life is an advantage to her because it helps her understand herself.

Kamla Das' poetry of loneliness and frustration therefore gives it true meaning, if it is analyzed as the record of the spiritual progress of her agonized soul. It harmonizes with a spiritual quest for the meaning of love beyond the body. Her romantic cry: "O Krishna, I am melting, melting, melting" is symptomatic of the fact that she has attained a higher state of mind where the self merges with the infinite; physical agony and the pain see poised at the spiritual level of awareness.

◀ *The Old Playhouse and Other Poems (1973)* shows Kamla Das at her best for the poems in this volume are richer than her early poems both in meaning and in matrix. While the theme constituting nature of love, lust and frustration continues, the deeper meaning is expressed in the treatment of subjects like life and death, disease and decay. The poetess depersonalizes her experiences in the human situation and hence every reader's mind gets depersonalized to enter her world of literary art. Dante experiences hell while composing *The Divine Comedy* and the reader experiences his own hell while reading it. Depersonalization makes the hell inherent in the situation all the more easily available for experience.

In many of her poems in *The Old Playhouse and Other Poems*, Kamla Das visualizes herself in a trap. In 'I shall Some Day,' she wishes to study what the trap actually is. She writes:

I study the trappings  
Of your body, dear love  
For I must someday find  
As escape from its snare.

The poetess compares herself with a convict who studies the prison's geography carefully in order to find an escape from it. The word 'trappings' stands for mortal dress in which the soul is trapped. She wishes to transcend the share of lust, which is embodied in her lover.

In 'The stone Age,' another poem of this volume, the husband is viewed as an old 'fat spider' who weaves web of illusion around her. He has created a domestic stone age for her and destroyed her body in a hundred ways:

You turn me into a bird of stone, granite  
Dove, you build round me a shabby drawing room,  
And stroke my pitted face absent minded  
While you read.

'The Drawing Room' in *The Old Playhouse & other Poems* is also visualized as a trap. Even the air-conditioner is of no help. The cut flowers smell of male scent.

There is  
No more singing, no more a dance, my  
mind is an old  
Play house with all its light put out.

The poem emphasizes, the poetess' anguish, restlessness and her untiring efforts to demolish the wall of the trap around her. One who is not well conversant with Indian philosophy cannot appreciate fully about, what a deep meaning is enfolded in these apparent and simple but puzzling lines. Love- lust -frustration has made her wise. She has also known that the body's complain may lead her to commit another mistake. She finally settle down with a definite idea i.e., to transcend the physical world. She also develops the vision that the house she lives in is a temporary one.

With a cheap toy's indifference  
I enter others'  
Live, and  
Make a very trap of lust  
A temporary home.

After such experiences, her female body feels beaten. Her spirit cries. It rebels against the mortal dress. It wishes to throw off artificial barrier around it. The nature of such despair has been discussed in *The Gita*, the wisdom literature of India, which preaches that "the delights that are contact born, they are virile wombs of pains (Duhkha yonya), for they have beginning and ending; O Kaunteya, not in them rejoice the wise." At another place, this holy book reads- "wisdom consists in an insight into the pain and evil of birth, death, old age and sickness." Further, this earth and the mundane existence have been described as "the ocean of death and existence." Kamla Das must have grown wiser after penning the two volumes of her poetry. So long as she pursued the worldly aims- her marriage, her golden dream of settling down with Carlo, a foreigner, she found everything slipping out of her hand. However, her realization of the mundane existence has made her serious about her life.

For Kamala Das, death is an obsession. She writes:

I have been for years obsessed with  
the idea of death.  
I have come to believe that  
life is More a dream and that death is  
the only reality.  
It is endless, stretching before and  
beyond our human existence.  
To slide into it will be to  
Pick up a new significance.

On several occasions, death appears to her as an easy escape from the loneliness of life. In most of the poems, frustration leads her to wish to die. 'Fire' and 'Flame,' the recurring symbols in her poetry, are also associated with death and funeral. In 'Word Ash,' the fire is a devastating energy burning down everything. In 'Forest Fire,' it is all consuming passion to ingest all experiences. Flame is the seed of Fire-tree and The Ghanshyam, the lord is evasive like a 'spectral flame' 'flame' shares the funeral quality of 'fire' and in 'Composition' the ruin brought upon a woman who loves an unsuitable person who has been characterized as moth flinging on a flame. All these prove the Das' poetry is a depiction of her brave suffering. She boldly peels off her inmost feeling in all their nakedness. The fire of lust roasts her body and fills her psyche with spiritual despair.

The poem 'After the Illness' has hardly any romantic details. It describes a stage after prolonged illness. The atmosphere is peaceful and serene. The lovers have been reunited and well settled. They exchange their views and the lover enquires about her health. She has become extremely weak owing to sickness. What is remarkable here is not that there has been no death after illness, but a reawakening into this surprising state where the lover looks beyond her body: "For him, was it perhaps the deeply hidden soul?" The poem oscillates between what Kohli rightly calls "the beauty of sexual love and that of spiritual love." The acceptance of her physical attractiveness by the lover though heightened by his vulnerable desire provides a sense of security. This is an unusual role, and the poetess can not help but to amaze at it. This also shows that the fire of passion or lust, which dominates the earlier books occasionally surfaced in *The Old Playhouse & other poems* too. Although the present book depicts the mood of dejection and defeat, it has not altogether disconnected itself from the earlier style and tone.

'The High Tide' is a poem, which allegorically presents a man in power politics. The poem resembles 'The Proud One' in *The Descendants* where the lover after a failure in love embraces politics. In 'The High Tide,' the king loses power and with the power, he loses the love and the loyalty of the dancing girls and the crowd, which admires him. The poem depicts the high tide of despair as the king has lost all contact with the external world. His voice is grief-lynched, thick and harsh. This implies that power comes from love and love is power.

In the poem, 'Blood' of *The Old Playhouse and other Poems*, the ancestral house has been referred to once again. There is a culminating poignancy in the poem when, the cremation of the great grand mother is described in terms of the crumbling of the great house. Both the house and grandmother signify a tradition deeply rooted in the poetess' psyche. It was the grandmother who had created an awareness in the poetess of her family splendor and cultural ethos:

She told us  
That we had the oldest blood  
My brother and she and I

The oldest blood in the world.

The great grandmother's concern is not only emotional but also philosophical. She being the head of the family stands out as a long cherished tradition of the nairs'. When she addresses the poetess and her brother, it is the poetess who shows this strong sense of family tree. Vrinda Nabar has made an illuminating explanation:

The death of the house need not be interpreted literally in terms of physical decay. It could not refer to the corruption of the old bond, of traditional values, and of the erosion of the moral fabric on which the house/ family circle had been built.

Kamala Das listens the dying noise of the great house. This conveys that letting down the house is letting down the great tradition and the dismantling of the memories that have grown around this tradition. This also means a total collapse on the part of the poetess' hope. The memory of the past work, for her is food for future. In times of boredom and trauma, she takes refuge in the days spent with her grandmother at Nalapat. It was here that she felt fully protected. 'After the Illness', is the only poem where peace between the lovers is heightened. The lover's acceptance of her physical attractiveness is visualized as rebirth. The poetess' reawakening plunges her into the deep mystery of the body and soul relationship. Ramchandran Nair aptly remarks:

In spite of the body's unattractiveness and  
The skin's numbness, what makes her husband  
Lust for her? Is it the deeply hidden soul  
That lust? Are the body and the soul  
separate? Is not the soul deeply hidden  
in the body? Those reflections impart a  
halo of inscrutability to the poem

After a prolonged illness, the poetess comes to realize that the body and the soul are not two different entities. The body keeps the soul informed all the time. Despair also lurks even in such a realization. Torn between the matter and the spirit, the poetess settles down with an idea that beauty is only skin deep. The true love of her husband helps her survive from illness.

The readers of Kamala Das share her ever-growing experiences with repeated shocks. Kamala Das herself admits:

Each time I have wept, the readers have wept with me.  
Each time I walked to lovers' house like a bride, my  
Readers have walked with me. I have felt their eyes  
On me right from adolescence when I published my

First story and was called controversial. Like the eyes  
Of an all-seeing god, they follow me through the years.

As a perfect feminine voice, Kamala Das has shown the readers every nook and corner of the female's heart. Her honesty has certainly cast a deep effect on her readers. Moreover, she has been able to produce a feminine psyche in all its variety. A weaker-sex as she is, she wails for love, security and integration in all her poems. She fails all fronts, gets her heart wounded, tries to adjust with a male dominated world and again retreats to her anguished soul.

As she advances in age, she comes to realization. Her love cries seem to have purged her of all physical desire. That is why she could transfer her devotion to Lord Krishna, and towards religion in the form of worshipping him after the repeated attack of illness, she could shed her carnal desires as a snake might shed its skin. As a result, many poems on the Radha Krishna myth appeared later on in which her longings for true love are fully pronounced. Radha's loneliness because of Krishna's abandon to humble her pride has been juxtaposed with the poetess' own sense of loneliness owing to her husband's apathy. Indeed, the Radha-Krishna myth has filled the poetry of Kamala Das with spiritual yearning for melting into the divine. Her seriousness about the loss of the soul in the materialistic world is a metaphysical quest, a spiritual cry born out of despair.

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# TRADE RELATION BETWEEN BORDER NAGA VILLAGES OF TUENSANG & MON DISTRICTS WITH BURMESE FROM PRE-COLONIAL TO COLONIAL PERIOD.

L. J. NEKEN JAMIR  
Asst. Professor,  
Dept. of History

## INTRODUCTION

The simple meaning of trade is a way of traffic, a course or a way of livelihood. So the trade relation is a way through which people, communities or nations are related or connected. They are mostly engaged in selling and buying and in the exchange of goods. Trade is a device or means which leads the society or community to the economic development and growth. D.A Robertson epitomized the role of trade in development by his famous statement that, "trade is an engine of growth."<sup>1</sup>

## NATURE

The nature of trade relation of the Nagas and the Burmese was mostly barter system. However, in some exceptional cases, they used "Danki"<sup>2</sup>(a bell-metal cauldron) as a medium of exchange for big transactions. One Danki was equivalent to one Mithun, and for smaller transactions they sometimes used cowries. The traders usually travel by a circuitous and very difficult path so as to obtain supplies. During the colonial period, they sometimes used water way of Tezu river which flow into Chindwin river which again flows through the plains of Burma.<sup>3</sup> There was no boundary or trade restrictions.

Trade is essential for the growth and development of any society or nation. It is difficult to say when trade begun in human society. However, one thing is clear that when one cannot produce enough to his needs or wants, trade begun to take place through barter system or otherwise.

All individuals are not equally suited to produce all goods, either because they are differently endowed or for other reasons. H.L Mannur remarked, "Nature has distributed the factor of production unequally over the service of the earth."<sup>4</sup> Different people and lands are endowed with different natural resources, climate conditions, mineral resources and mines, labour and capital skills, etc which determines the capacities to produce goods and services. All these differences in production possibilities lead to situation where some people or country can produce some goods and services more efficiently than others.

All persons living in the mundane surroundings perform economic activities for the satisfaction of their wants. But when he cannot produce all his wants he seeks for the help of the others and enter into trade relation,. In doing so, both the seller and the buyer satisfy their economic desire. G.B Jathar and others rightly said, "Both the parties to the exchange enter into it voluntarily and each believes that on the whole he gains by it."<sup>5</sup>

There was internal trade among the different Naga villages and tribes. They not only trade in their local product but also brought goods from Assam and in doing so, some intermediaries came into being. J.P Mills observed, "much of that salt so obtained is sold to Phoms and changes across the Dikhu for pigs, fowls, etc. An Ao selling to trans-frontier tribes in this way expect to make about 300%"<sup>6</sup>

The trade between the bordering villages of Mon and Tuensang with the Burmese have been carrying out since long time. There was no road, vehicle or cart. The traders carry the loads on their heads and travel the difficult hilly paths. The absence of proper and easy road was the main reason why these trades could not grow extensively inspite of so many years of trade relation between the Nagas and the Burmese.

They mostly traded in beads, salt, rice untreated cowries, weapons, implements, precious stones, wax, etc. Cowries were in high demand of the Nagas as it was studded in their traditional dresses. The untreated cowries are said to have reach Angphang (Konyak) from the Burmese side."<sup>7</sup> The daily implements like long dao, axes, etc were also imported from Burma. Verrier Elwin remarked, " these axes are evidently of Burmese manufacture,"<sup>8</sup> salt was the most important item supplied from the Nagas to the Burmese.

Apart from trading in goods, the nagas also learnt skills and techniques to make implements and gun. The Konyaks learnt the skill of making muzzle loaders (gun ) from Myanmar in pre-colonial times.<sup>9</sup> As a consequence, the Konyaks were the first to make the muzzle loader gun and became experts in handling it.

In rare cases, slave trade was also practiced. These slaves were mostly war captives. C.V.F Haimendrof noted, " for the Pangsha men assures us that the child has really been sold across the Patkai through the mediation of Tsawlaw, but they know which village bought her."<sup>10</sup>

In the Naga-Burmese trade, in due course of time, developed some intermediaries. The goods were supplied to and from Burma through them. The Konyaks and the Khamniungans acted as intermediaries in such trade and prevented the tribes living in the interior to have direct trading relations. Agriculture was the life of the Nagas which was deeply interwoven with their culture and tradition. Nagas did the trading business as a part time and there was no business community. They carried out the trade mostly during winter when the path became accessible after the rainy season. All the parties engaged in trade were benefited from it.<sup>11</sup>

The villages living on two sides of the mountain that separate the two countries have been emotionally close since long and there was free movement between them. Even marriages also sometimes took place between the people. The social, customs and traditional practices of the

Khiamniungan Nagas are almost similar to that of the Burmese Khiamniungans. The village administrative system and the social set up of some Naga tribe are similar with the Burmese. In this regard Julian Jacobs stated, "Kachin and Naga hill area share a similar kind of organization. Kachin and Konyak Naga share a basic class structure."<sup>12</sup>

From time immemorial, man practiced trade. The trade between Europe and Asia, particularly with India, was very active. India had both land and sea routes that connected her with Europe and Egypt. The Byzantine Empire served was fallen into the hands of the Ottomen Turks, the land route was disrupted and blocked. The European trading motive played an important role in the discovery of sea route to India.

Indians were very active in both internal and external trade right from ancient time. India's external trade was mainly through land route of North-West and the passes through Hindukush Mountain. The Harappan people had trade relation with their contemporary Egyptians through the sea port of Lothal. During the early centuries of Christian era, the South Indians had trade relation with the outside world which was controlled by the dominant dynasties like the Cholas.

India's external trade with the eastern countries through land route was carried out through (1) Sadiya and Upper Assam of Tibet or China, (2) pass of Debong, (3) Mishmi route, (4) Phugan pass to Manchu and China and (5) the route from Manipur to the Irrawady and the Patkai pass to Bhamo on the Irrawady.<sup>13</sup> The most important, easy and mostly used route was through the Patkai to the upper district of Burma and thence to China. After seeing the trading opportunities, the Mughals tried to annex North-Eastern territories during the Pre-colonial period. Alokash Barua remarked, "Mughal's repeated attempts to conquer this region were guided by the sole interest to took eastward for growth in trade and expansion of the empire."<sup>14</sup>

During the colonial period, the British India government imported tea seeds and buffaloes from Burma. Nagas had trade relation not only with the Burmese but also with the Assamese since long. They mainly traded in agricultural products, salt, implements, etc. Alemchiba stated "from time immemorial there used to be regular trade between the Nagas and the people of Assam."<sup>15</sup> Nagas and Assamese not only traded but lands were also granted to Nagas by the Assamese. These lands were known as 'Naga Khats'. Fishing rights were also granted to some Naga chiefs in the waters of the plain which was known as 'Bheels'. Commenting on the Ahom-Naga relation, Sir Edward Gait remarked, "In the time of the Ahom Kings, those near the frontier used to pay annual tribute of elephants tusks, etc in return for which they obtained grants of land, are still enjoyed. These people carry on a considerable trade in cotton and other hill produce, which they exchange for salt and rice"<sup>16</sup>.

### DIFFICULTIES:

1. There was no transport and communication between the bordering Naga villages and the Burmese. The goods were carried by man which limited the scope for extensive trade.
2. Inaccessibility from one place to another due to thick jungle between the bordering villages made the traders difficult to carry out trade in a wider scope.
3. The people of the bordering villages on both sides were illiterate. They had no knowledge at all to meet their immediate needs and therefore the question of wider and extensive trade was unthinkable.

### SUGGESTIONS

1. Roads should be opened and improved from both the Indian as well as Burmese sides for easy and extensive trade. If there is no road there will be no development
2. Studies should be undertaken to trace out the social harmony and the economic conditions of the Nagas and the Burmese.

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# Why is not Pluto a Planet?

Dipak Nath  
Assistant Professor &HOD,  
Deptt of Physics,

## ABSTRACT

*Pluto was discovered by Clyde.W. Tombough on march13, 1930. From the time of its discovery up-till 2006, Pluto was classified as Planet. In the late 20<sup>th</sup> and early 21<sup>st</sup> centuries, many objects similar to Pluto were discovered in the outer solar system. The notable being the scattered disc object Eris in 2005, which is 27%larger than Pluto. On August24<sup>th</sup>, 2006, the International Astronomical Union (IAU) defined what it means to be a 'Planet' within the solar system. The definition of IAU excluded Pluto as a Planet instead it was classified along with Eris and Ceres in a new category called "Dwarf Planet".*

*The present paper highlights the features of Pluto and reflects the status of Pluto in the solar system. In studying the many investigations and researches on the Pluto in recent times, in the end it is observed that many scientists still continue hold on to the belief that Pluto should be classified as Planet.*

## INTRODUCTION

The branch of Physics which deals with the physical and chemical properties, origin and evolution of the celestial bodies is called Astrophysics. "Why is not Pluto a planet?" provides a readable account of knowledge of the solar system and the concept of what has been considered to be a planet.

## DISCOVERY

Percival Lowell (USA, 1855-1916) was the founder of Lowell Observatory, Arizona. He started an extensive project in search of a possible ninth planet, which he termed as "Planet X". The Director of Lowell Observatory handed the job of locating "Planet X" to an American Astronomer Clyde. W. Tombaugh. On February 18, 1930, Tombaugh discovered "Planet X" and was telegraphed to the Harvard College Observatory on March 13, 1930.

### WHAT IS THE NAME OF "PLANET X"?

The Lowell Observatory which had the right to name the "Planet X", received over 1000 suggestions, Tombaugh requested Slipher (Director of Lowell Observatory) to suggest a name for the new object quickly before someone else did. Constance Lowell proposed Zeus, then Percival and finally Constance. These suggestions were disregarded.

The name "Pluto" was proposed by Venetia Burney (1918-2009), an eleven year old school girl in Oxford, England. Venetia was interested in classical mythology as well as astronomy and considered the name, a name for the Roman God of underworld, appropriate for such a presumably

dark and cold world. This planet was officially named as Pluto on March 24, 1930 and was announced on May 1, 1930.

### SYMBOL OF PLUTO

It has been noted that the symbol of Pluto (♇) is a monogram constructed from the letters "PL" which are the initials of Percival Lowell.



Pluto

### CHARACTERISTICS OF PLUTO

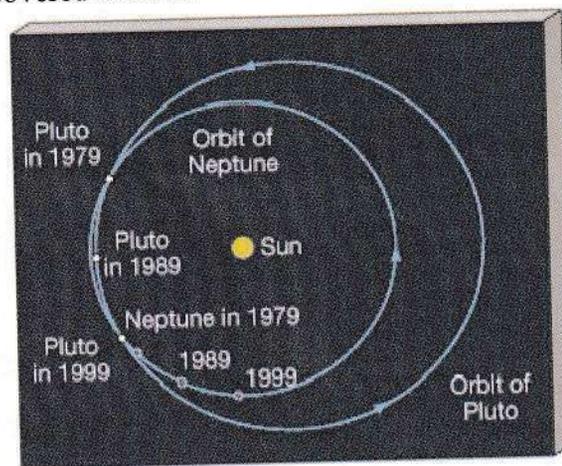
Like other members of Kuiper Belt, Pluto is composed primarily of rock and ice and is relatively small. It has a highly eccentric inclined orbit. Pluto's orbital period is 248 Earth years. Its atmosphere consists of a thin envelope of nitrogen, methane and carbon monoxide gases. Pluto has four moons, the largest being Charon, along with Nix and Hydra, which were discovered in 2005 & the provisionally named S/2011 P1, discovered in 2011.

### DOUBLE PLANET

Pluto's satellite, Charon, is nearly half its size, because of which Pluto is called **Bi-planet** or a **Double planet**.

### PROBLEMS WITH PLUTO

Pluto has strange orbit. It crossed Neptune's orbit on January 21st, 1979, made its closest approach on Sept 5th, 1989 and remained within the orbit of Neptune until Feb 11, 1999 i.e. Pluto's orbit overlaps Neptune's orbit, which caused it to be the 8th Planet from the sun during 1979-1999. On February 11th, 1999 Pluto crossed Neptune's path and become the 9th planet again.



### IS THERE A 10th PLANET?

Astronomers think they have discovered the 10th planet. In 2005, Mike Brown and his team discovered an object named Eris. Eris is larger, made of same ice/rock mixture and more massive than Pluto. Finding Eris caused other astronomers to talk about what makes planet "A PLANET".

So if Pluto is a planet than there are other objects that may also be considered PLANETS within the **Kuiper belt**.

## COMPARISON

### PLUTO

- 1.Mass: $(1.305 \pm 0.007) \times 10^{22}$ kg
- 2.Diameter:2390 km
- 3.Density: $(2.03 \pm 0.06)$  g/cm<sup>3</sup>

### ERIS

- 1.Mass: $(1.67 \pm 0.02) \times 10^{22}$ kg
- 2.Diameter:2397km
- 3.Density $(2.52 \pm 0.05)$  g/cm<sup>3</sup>

## DILEMMA

With Eris being larger, made of the same ice/rock mixture and more massive than Pluto, the concept that we have nine Planets in the Solar system began to fall apart. What is Eris? Is it a Planet or Kuiper Belt Object? What is Pluto, for that matter?

## ASTRONOMER'S DECISION

Astronomers decided that they would make a final decision about the definition of a planet at the 26<sup>th</sup> General Assembly of the International

Astronomical Union (IAU), which was held from August 14<sup>th</sup> to August 25<sup>th</sup>, 2006 in Prague, Czech Republic. In the Assembly, the IAU passed a resolution defining planet in such a way as to exclude Pluto from the planet and established a new class of objects in the solar system to be called "Dwarf Planet" which was deliberately designed to include Pluto. According to IAU,

### (1) A "planet" is a celestial body that:

- (a) is in orbit around the Sun,
- (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and
- (c) Has cleared the neighborhood around its orbit.

### (2) A "dwarf planet" is a celestial body that:

- (a) is in orbit around the Sun,
- (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape,
- (c) has not cleared the neighborhood around its orbit, and
- (d) is not a satellite.

(3) All other objects, except satellites, orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".

## The candidates size-wise: Eris, Pluto, Ceres (and Earth)



## CLEARING UP THE NEIGHBOURHOOD

As planets form, they become the dominant gravitational body in their orbit in the solar system. As they interact with other smaller object, they either consume them or sling them away with their gravity. Pluto is only 0.07 times the mass of the other objects in it's orbit. The earth, in comparison, has 1.7 million times than of the other objects in it's orbit.

### PLUTO'S DEMOTION

As Pluto does not meet the 3<sup>rd</sup> criteria of Planethood, IAU on august-24, 2006 declared Pluto as "Dwarf Planet".

### TWO TYPES OF PLANETS



### CONCLUSION

Even though Pluto is a "Dwarf Planet" and no longer officially a Planet, it will be a fascinating target for study. And that's why NASA has sent their "NEW HORIZON" off to visit it.

The "NEW HORIZON" space craft was launched on January 16, 2006 & will make its approach to Pluto on July14, 2015.

### DISCUSSION

Every 228 years Pluto crosses inside of Neptune, so technically speaking it does not clear its neighborhood. It also means that Neptune does not clear its own neighborhood. Mars & Jupiter do not clear neighborhood as they interface with Asteroids and the Earth actually orbits the sun with thousands of Asteroids. So the earth does not clear its own neighborhood.

If we use the definition set forth by IAU, Pluto, Neptune, Jupiter, Mars & the Earth, also are not Planets but "Dwarf Planets". As lots of astronomers are not happy with the new definition, there is a hope that the definition of planethood could be voted for change.

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