

Drawing a reference to the discussions held at Paryavaran Bhawan at New Delhi on the 5th August, the following note is submitted for further future introspection into the whole matter.

The international Biodiversity Convention which has been formally signed by India at Rio in 1992 appears to be improperly balanced because conservation and sustainable use is being talked about in the same breath, when it is well established and already clearly known that human over use and abuse of the biodiversity is the chief reason of the depleted stock of bio-resources in the wild to-day leading to adoption of this convention. If the major aim of the convention is to conserve the wild biodiversity in a viable state then utilization of the same should take the back seat, even though human race requires these resources for survival. But surprisingly this does not appear to be the message sent out by the convention and its outcome, 'Agenda 21'. A little discussion in this context should not be out of place, specially in the context of the North-East region.

The present status of the Biodiversity resource in Assam (N.E. as a whole) is probably at best indeterminate. New biological species are still being discovered in this region, but there is hardly any baseline data about the biodiversity resources, this area contained in the past, to compare the same and to understand the loss sustained. All the same it can be said without any uncertainty that such resource base as a whole has become 'scanty' and many varieties may be threatened with probable extinction. The main reasons for such depletion of the resource appears to be overuse and shrinkage of the natural habitat, mostly due to biotic intervention.

The biodiversity in the wild is present in the natural ecosystems, that had been evolved through aeons of time. But increasing demographic pressure coupled with the changing life style is relentlessly putting mounting pressure on the natural ecosystems of this region, depleting the stock further and further. The poor status of the biodiversity of this region, may be of the country, is clearly evident from the continuously lengthening list of 'Endangered species' both floral and faunal. The forested area has shrunk almost half of what it used to be, even during the independence, about 50 years back. Human settlement and agricultural grounds have eaten up almost all of the forested areas (nearly 15000 sq. k.m. of U.S.F.) that used to supply the local need of forestry resources and even more. Besides, over 15% of the Reserve forest areas of Assam has gone under encroachment for over a decade with very little chance of retrieval.

Further to the above, illegal grazing by a huge domestic cattle stock and collection of various N.W.F.P. is impairing not only natural regeneration but also causing irreparable damage to the highly complex but fragile natural ecosystems. Various plants have become rare and endangered, not to speak of various wild animal communities. As a result of this immense pressure on wildlife and the natural habitat, normal density of wild animals is non-existent in areas outside Protected areas, which are however, zealously protected, though against heavy odds. Management of forest and wildlife has become a stiff challenge because of the imbalance in demand and supply situation.

The quality of the forest has also seriously been impaired because of sustained overuse of forest produce. Working plans got neglected and deviations become so numerous that it proved, 'Exceptions are really the rules'. Exploitable girth limit of several valuable timber species was lowered during the past with the objective of meeting the demand on one side and to drive targeted revenue on the other. No wonder that an area with tropical evergreen and semievergreen forests had to import ply wood species from far away Malaysia to run the string of ply wood factories in eastern Assam, the only timber based industry in the state. Naturally many species of forest trees, specially of economic value gradually became sparse, at least locally. Example of *Morus alba* in Western Assam, *Gmelina arborea* all through the state and *Podocarpus nerifolium* in the central Assam - southern Assam hills may be sighted as examples. Another startling example may be various species of canes that used to be very common in the entire state of Assam and in the north-east. Cane is a species associated with moist or wet areas and generally signifies very dense and close forest. It is appalling that most species of cane has become rare in most parts of Assam. In fact in some areas cane is no longer found at all. Though the main reason of the depletion of cane is unscientific over-exploitation, yet in some areas it appears that there has been some change not only in the canopy conditions, but also in the microclimatic conditions, which might have effected the indicator species in its replenishment. All these are rather ominous ecological microeffects that are likely to cause irreparable damage to the natural ecosystems, which holds the enormous range of the broad-spectrum, of the biodiversity in the wild, that had resulted in recognition of this zone as a "Megadiversity" area in this subcontinent. The erosion of the biodiversity is continuing unabated, if at all at accelerated pace. The problem of over use, either legal or illegal has certainly been caused because of unprecedented demographic pressure. But this problem has also been compounded by a significant change in the lifestyle of the indigenous people which has resulted in comparatively more per capita consumption of all bioresources, exactly contrary of what should be aimed at in a crisis situation. The age old and traditional compassion to all life forms and containment in austerely in life-style has

been on a drastic wane. Cultural values of nature and its elements has been mostly transformed into materialistic values may be because of consumerism making inroads, changing the traditional value system, which had been basically conservation oriented.

But even otherwise conservation through proper management of natural renewable resources in economically poor areas is anything but easy, as such resources not only sustain human communities but also is looked upon as a source of state revenue.

Forestry management is based on the principle of utilisation of a part of the "Sustainable yield". But the extraordinary demand and the consequent pressure exerted by the human factor has resulted in serious abaration. The Forester seems to have lost his way some where during the past under this pressure and has deviated from his 'Bible' of sustainable yield. The quality of the forest has thus been badly degraded and the natural ecosystems seriously effected.

Due to opening up of the natural optimum canopy cover in the hills there has been severe soil run off causing floods. This has not only resulted to substantial agricultural loss, but also has caused a gradual fall in natural biomass productivity which should be taken as the most ominous effect. The mean annual flood damage far exceeds the annual budget allocation for Development, which seems to be a major reason behind the desperate economic situation of this most productive zone in the whole country.

The over-use and abuse of the ecosystems accelerated probably by the end of world war II with new areas gradually made accessible. But most of the natural resources tapped from this area reached markets outside the state and the % of such resources that went out of the state may be as high as 75% to 80% of course the local people who had been instrumental in extraction of such resources derived some marginal "bread crumb" benefits, which was grossly insignificant compared to the total economic turn over, not to speak of the dreaded ecological imbalance and loss that accrued for the future generations. In simple words the future of the local communities had been taken at ransom for economic gain accrued mainly outside the state. The local communities now face the bleak prospect of a severelly reduced natural renewable resource stock and nothing else to fall back on except agriculture which is also under a siege of annual devastation, floods and a waning natural productivity. These are unmistakable signs of a failing "Ecological economics".

Retrieval from such a dangerous and perilous situation will not be easy by any stress of imagination. What is needed at the moment is probably to fathom the quantum of the natural renewable resources available at "Sustainable yield" basis and the demand

of the Human communities at present. If this difficult equation can be carefully worked out, only then it may be possible to devise ways and means to contain the still rising demand and utilisation of such resources to strike a balance of the 'ecological economies'. Simultaneously steps will have to be taken to enhance the resource stock which alone may provide augmentation of the sustainable yield. For achieving this objective there seems to be no other alternative but to rest the ecosystems, at least partially which alone will be able to rejuvenate the stock and consequently the sustainable yield.

But the convention does not seem to be aimed at this solution at all which is proved from the fact that extraordinary stress has been laid on "Sustainable use" & "Equitable distribution". The word "Sustainable" has lost its true meaning because of a widely varying range of quantum use of the same renewable resources in various parts of the globe, which depends on the "Standard of Life" where the most important "quality of life" has become almost irrelevant. Thus the per capita use of such renewable resources in the "developed world" (so called) is many times more than those in the under developed or developing world. But cynical though the developing world is doing their best to ape the developed world, which in simpler words will add to the already unsustainable consumption pattern. Ironically at present most of the renewable resources are mostly concentrated within the confines of the developing world and such a misplaced notion shall effect these nations adversely and impoverish them much further, exactly opposite to the objectives.

One of the major reasons of local discontent in the North-east is that the natural resources of this zone is being siphoned out providing minimal or no benefits to the local communities. This view is debated frequently, but one look at the regional per capita income (G.D.P. if you like) will probably reveal facts. Assam which had been amongst the top 5 states in India as far as per capita income is concerned during the Independence is now amongst the bottom 5 states ! Industrialisation is a far cry and may not be wise to adopt also in a zone, which holds extraordinary biodiversity and is listed as a megadiversity area, for obvious reasons. Here natural biomass productivity is of top most importance, but most unfortunately this is in the wane which is most alarming. All this bleak prospect has resulted from over use and abuse of the natural renewable resources, which still continues unabated, if at all at an accelerated pace.

The Biodiversity convention does not appear to have addressed the vital issue of losing "Ecological economics", demand and use far outstripping the so-called "Sustainable use". I am afraid that the underlying thrust of this convention has gone to over emphasize "USE" and "EQUITABLE DISTRIBUTION" rather than true

"CONSERVATION". I am afraid, this will merely add up to and formalise colonisation, in some form or the other, of the poor areas by the rich areas. Equitable distribution may invite international property right through which the poor will be further deprived of the possible benefits that should accrue to them as inheritors of invaluable biodiversity that is held by their own areas. India has gained independence from centuries of colonisation only 50 years back. But I am afraid this convention and the proposed Act is going to provide the base of another form of colonisation by the rich and developed countries.

If we have to find a solution to the colossal problem facing the human community today, we have to determine what should the quantum of consumption be, that may be commensurate with the "Sustainable yield" of the renewable resource stock available at present. We must also simultaneously make full focus and all concerted efforts to rebuild our resource stock to the adequate desired limit for future viability.

One more point, almost all our biodiversity in the wild is restricted within the confines of our natural ecosystems, terrestrial and aquatic (marine and inland). Obviously the managers of such resource are of top most importance in considering the present situation and obtain a solution. But I am afraid this important matter has been glossed over for whatever the reasons that could be.

Though the Biodiversity convention has been signed by India and as a consequence the proposed Act is being debated, I fail to accept the basic tenets of the convention itself. Naturally the proposed Act will not be acceptable, at least in its present form, which appears to be simply a line idea, rather than what can be turned as an Act. This stand I am duty bound to take for the sake of the future ecological interests of the indigenous impoverished people of this deprived region.

S. DEB ROY

PRESERVE TREES FOR PRESERVING HUMANITY.

That the inert plants have also life was proved quite laterly in the early twentieth century by an Indian Scientist, Acharya, J.C. Bose. That plants are living objects and do have a great role to play in Evolution is beyond any dispute. This is the major reason why plantlife in the natural state of propagation is included in the term "Wildlife" in the present day concept of ecology.

That all the life form existing in the world are interdependent is now an universally accepted fact. The degree of such dependence varies to a great extent and in many cases such dependence may be only imperceptible, very hard to realise. In still other cases such dependence may be just dormant. But all the same any life form, be it plant or animal and however inconspicuous it may be, is really invaluable in the ultimate process of sustenance of life in this world through the eternal process of Evolution. The full extent of the extremely complicated linkage between the life forms may really never be fully explored ~~now~~ because with the passage of time and advancement of science it has now been clearly realised that many dormant and unnoticeable aspects surface with process of Evolution only.

However, in the natural process of evolution there exists a balance between the availability of natural resources, both exhaustible and renewable and its consumer's use which maintains the sustained viability of the life forms, of which humanity is one component. The various ecological forces interact and maintain this ecological equilibrium which is supreme for continuence of life on earth.

Before the emergence of man through evolution, this equilibrium had rarely been disturbed as availability of the natural resources far outweigh the usage. But with the appearance of man and his relentless quest for advancement and civilisation, the shape of things took a turn. Man started reshaping nature as per his own needs and conquered many hitherto unsurmountable barriers. He partially own over the process of decay through natural disceases and started to sultiply like no other species in nature.

Naturally the demand for the natural resources for his use soared higher and higher, particularly keeping pace with his increasing advancement of confort and easier life style. This consequent demand of the bursting population of man could not, in many cases fore-see the gradually depleating stock of both the renwable and the exhaustible natural resources, rendered so through actual overuse or even misuse. Thus many species of life form, both plant and animal, were pushed over to total or local extinction through the unbounded

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lust of man. This loss of any species is really incalculable and in many cases the actual damage can hardly be estimated as the actual potential of any life-form, however inconspicuous it may be on human eyes, cannot instantly be explored. Every species is a store house of genetical qualities and therefore diversities, on which the entire process of Evolution revolves and thereby depends, and any loss of a single species thus jeopardises the whole process, limiting the scope of future evolution.

In this context it may therefore be clearly understood that man cannot afford the luxury to be a witness to overuse or destruction of any natural resources at his command for the sake of amongst other reasons, his own future existence. The future and the very existence of humanity depends on other life-forms and hence he has to, under compulsion, preserve plantlife i.e., trees for his self interests.

It may be superfluous to reiterate that trees absorb carbon dioxide - an animal waste, and produce oxygen by utilising solar energy through photosynthesis and oxygen supports all forms of animal life including humanity. The absorption and utilisation of solar energy is beyond the animal community and hence the basis process of food production for animal community therefore depends on the plantlife i.e., trees. We simply do have no choice, but to preserve trees.

In the present day context this matter deserves even more serious attention with the universal back-drop of overuse of trees for innumerable human purposes, specially in the tropical region, where the widest diversity of plant life exists and such areas can be regarded as a storehouse of genes. During the last two centuries man has been instrumental in already obliterating a large number of species from the surface of earth, thus virtually cutting the proverbial branch of the tree on which he himself is perched. But fortunately he has realised his folly, may be just in time and may still be able to save himself by preserving trees. Let us remember what our philosophy had recorded in our Ishpanish.

Which means :-

This universe is the creation of the supreme power for the benefit of all his creations. Individual species must therefore learn to enjoy its benefits by forming a part of the system in close relation with other species. Let not any one species encroach upon the others rights.

(S. DEB ROY)
Field Director
Project Tiger.

Some stray thoughts on "Wildlife"

WILDLIFE PROSPECTS

S. DEB ROY
Field Director,
Project Tiger

Conservation of wildlife has evoked a lot of genuine global interest during the last decade or two and India can be safely considered as one of the leaders in this aspect, at least amongst the developing countries. That Indian efforts are recognised and appreciated by the entire world, is manifest in our late Prime Minister Indira Gandhi being awarded ~~the~~ the prestigious award, which is one of the most coveted International awards in the sphere of wildlife ^{and nature} conservation. In another remarkable development, Dr. Swaminathan, a noted Indian Scientist has been appointed as the..... ^{Chairman}..... of the I.U.C.N., which is considered as the highest and most important world body on conservation of Nature.

All these recognitions ^{have} come through untiring efforts taken to preserve wildlife in India, which is one of the developing countries and where the conflicting interests of the wildlife and that of humanity is constantly clashing, making the going tough at each step for wildlife preservation. But even under the extremely trying conditions, when fixing of priorities and mustering resources, vitally essential for conservation of wildlife, on the face of growing demand for development, it can be really be very hard, our developing country could achieve some of the most remarkable objectives in the sphere of conservation under the stewardship of a conservation-oriented leadership and the dedicated hard field work put on by a properly oriented and motivated ^{band of tough} ~~hard core band~~ of wildlife field staff.

The spectacular success of Project Tiger, acclaimed all over the world as the most successful and the largest ever wildlife conservation project anywhere in the world, a whole-hearted attempt to save the elephants, the starting of the Wildlife Institute and many other similar but smaller projects testify for the efforts and the strong will to back such efforts in India.

But in the broad view of the conservation these efforts do not seem to be enough, if one considers the state of conservation that prevails in the country, outside the ^{exclusive} wildlife preserves. There will probably be hardly any dispute if one comments that the state of wildlife conservation in areas other than the wildlife preserves is practically lamentable. There may be a few happy exceptions here and there but these exceptions probably prove the general rule of the day. The wildlife status in most areas stands sadly depleted, habitat destroyed, in many cases transformed

unhabitable for indigenous wildlife by way of inducing monoculture of alien species for economic reasons and also unabated poaching either for protein or for economic gains. The alarming report that ~~sat~~ satellite photos reveal an annual loss of 1.3 million hectares of forest cover, which naturally is a direct loss of animal habitat will naturally cause no end of worry to the conservation oriented people of the country, and for genuine reasons.

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Naturally with this rather alarming state of situations at the backdrop, it is about time to put all the shoulders to take up the challenge that is posed. There is no necessity to discuss why we have to save the wild denizens. This has been realised, though quite late, that we have really no other option for the sake of the future existence of our own race. This fact has been realised and continues to be realised that human life ~~form~~ and its existence is intricately interwoven with that of wildlife forms, both animal and plants, specially at this crucial juncture, when human population in our country is literally bursting at the seams and their demands for development is pressing the wildlife resources with their backs to the walls.

Though the above facts are now known, to at least the elites, and may be even to a large section of the common people, thanks to the publicity machinery hard at work, yet one may cherish a feeling that the depth and magnitude of the problem of conservation and the consecutive disastrous effects that may follow, if the attempts prove futile in future, has not been visualised fully. In other words, there seems to be a sense of complacency amongst most, who are otherwise abreast of the situation. Often interesting and sometimes quite valuable discussions are held, wildlife week is celebrated during the first week of every October, but soon afterwards things are pushed back in the lower order of preference till some other "occassion" comes by. Well, this attitude of, shall I call it apathy, will lead us nowhere, specially when the demand for all the exhaustible and renewable natural resources are continuously mounting. Loss of habitat seems to be the most corrosive of all the adverseries to wildlife and there is no reason to imagine that the situation, particularly in a developing country like ours is going to improve. In fact, on the contrary, to cope with the soaring demand, more and still more areas are only too likely to be snatched away from the wildlife for agriculture or other developmental works. The long list of the threatened species of both plants and animals are alarmingly increasing with passage of time and the genetic stock is getting poorer.

(Contd.3)

The potential of the apparently innocuous plant and animal life-form is being constantly realised in the present time of genetical engineering, which may ultimately prove vital in keeping the humanity viable, specially in the context of diminishing and already depleted natural resources, particularly the renewable resources. The realisation of this fact seems to provide the silver lining for the otherwise dismal field of conservation because man is utterly selfish, and can go to any length for his own self-centered interests.

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However preservation or conservation of wildlife is to be an all-embracing effort to achieve success. Unless the entire populace is properly oriented and adopts conservation in ~~their~~ lifestyle itself, any amount of legal protection and even proper execution of the concerning laws and rules are bound to give only marginal result - may be in the areas, specially constituted for the purpose. I don't intend to belittle the hard earned achievements in such areas by any way, but want to impress upon the point that unless we can extend this achievement into the other habitats which are providing us with the essential and much needed natural resources, the sad state of depleted status position of wildlife shall never improve. This means we shall be kept deprived of some of the resources, because of their threatened and critical status position, when we may need them most.

On the other hand it is much simpler said than done - orientation and motivation of the common mass, because of very practical reasons. A poor man, who may stay by the side of a wildlife area, may already know why he has to preserve wildlife, but may turn to be the chief source of scourage, when in a few hours his ripening crop is devastated by wild animals or his only pair of plough animal is preyed upon by a large cat and he stares suddenly into a shattered economy. Since he may have only marginal land holding, if at all, and a number of months to feed, his immediate pressing problems may turn him a bitter enemy of wildlife. I have come across many incidents where the only earning family member has been killed by a Tiger or Elephant, thus shattering the viability of a full family. It becomes futile, or even inhuman at times, to say that the dead person was actually at fault, and not the deprading animal or the family had encroached upon the animals' habitat, which is very often the reality. In fact, it is the most trying and tricky moment for a wildlife worker to talk to the lamenting, bereaved family members.

But fortunately our common people are extremely tolerant and they strongly believe in "Fate". With sympathy and a meagre helping hand most of them can be pacified, at least partially. But fact remains that barring payment of some ex-gratia grant for "accidental death" caused by wild animals, we have no other means to draw them into our folds.

When we have to have special wildlife areas for preserving wild animals, we owe certain responsibilities to nullify the probable damage caused to the property and sometimes even to human life by the wild animals in the neighbouring areas, populated mostly by poor to very poor people. Otherwise such people, who actually matters most, are only too likely to lose any sympathy for preservation, because their very existence is threatened. It is quite easy and sounds only sensible to take to preservation by the urban people but it is a completely different story to take up wildlife preservation for the rural people, who may reside by a wildlife area and make a co-existence with the wild animals.

Naturally the 'Do's and 'do not's' of living in conformity with the needs of preservation of Wildlife has to ~~then~~ be taken up as a lifestyle ^{by} for the rural people. And in doing so it can easily be realised what phenomenal wisdom our ancestral society builders had acquired in the ancient ages to prescribe various social and religious customs and traditions, all of which had a bearing on guarding against over exploitation of natural resources. The serious probable consequences of such over-exploitation had been clearly realised even in those forgotten days, though it remains still a mystery how this uncanny realisation had dawned on them. Our ancestors had been a ^{true} "Ecosystem" people and had devised norms to sustain the human society in perfect harmony with the ecological balance and with the natural resources providing the store house of their life supporting supply systems, without being depleted.

But with the advance of civilisation and scientific advancement, specially during the last couple of centuries, our people started to gradually shift from our traditional social and religious ways of life on the plea ^{that} of those customs and traditions being based on superstitions. There is no doubt that some of the customs had really been based on superstitions, which ^{could} be due to motivated persuasion of some pseudo-society builders' ^{vested} interests. But that was hardly any judicious basis of discarding the invaluable traditional customs, which gradually and imperceptibly, though unerringly, has brought us to the brink.

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All these recognitions has come through untiring efforts taken to preserve wildlife in India, which is one of the developing countries and where the conflicting interests of the wildlife and that of humanity is constantly clashing, making the going tough at each step for wildlife preservation. But even under the extremely trying conditions, when fixing of priorities and mustering resources, vitally essential for conservation of wildlife, on the face of growing demand for developmental activities could be really be very hard, our developing country could achieve some of the most remarkable objectives in the sphere of conservation under the stewardship of a conservation oriented leadership and the dedicated hard field work put on by a properly oriented and motivated hard core band of wildlife field staff.

The spectacular success of Project Tiger acclaimed all over the world as the most successful and the largest ever wildlife conservation project anywhere in the world, a whole hearted attempt to save the elephants, the starting of the Wildlife Institute and many other similar but smaller projects testify for the efforts and the strong will to back such efforts in India.

But in the broad view of the conservation these efforts do not seem to be enough, if one considers the state of conservation that prevails in the country, outside the wildlife preserves. There will probably be hardly any dispute if one comments that the state of wildlife conservation in areas other than the wildlife preserves is practically lamentable. There may be a few happy exception here and there but these exceptions probably prove the general rule of the day. The wildlife status in most areas stands sadly depleted, habitat destroyed in many cases transformed

unhabitable for indigenous wildlife by way of inducing monoculture of alien species for economic reasons and also unabated poaching either for protein or for economic gains. The alarming report that six satellite photos reveal an annual loss of 1.3 million hectares of forest cover, which naturally is a direct loss of animal habitat will naturally cause no end of worry to the conservation oriented people of the country, and for genuine reasons.

Naturally with this rather alarming state of situations at the backdrop, it is about time to put all the shoulders to take up the challenge that is posed. There is no necessity to discuss why we have to save the wild denizens. This has been realised, though quite late, that we have really no other option for the sake of the future existence of our own race. This fact has been realised and continues to be realised that human life form and its existence is intricately interwoven with that of wildlife forms, both animal and plants, specially at this crucial juncture, when human population in our country is literally bursting at the seams and their demands for development is pressing the wildlife resources with their backs to the walls.

Though the above facts are now known, to at least the elites, and may be even to a large section of the common people, thanks to the publicity machinery hard at work, yet one may cherish a feeling that the depth and magnitude of the problem of conservation and the consecutive disastrous effects that may follow, if the attempts prove futile in future, has not been visualised fully. In other words, there seems to be a sense of complacency amongst most, who are otherwise abreast of the situation. Often interesting and sometimes quite valuable discussions are held, wildlife week is celebrated during the first week of every October, but soon afterwards things are pushed back in the lower order of preference till some other "occasion" comes by. Well, this attitude of, shall I call it apathy, will lead us nowhere, specially when the demand for all the exhaustible and renewable natural resources are continuously mounting. Loss of habitat seems to be the most corrosive of all the adverseries to wildlife and there is no reason to imagine that the situation, particularly in a developing country like ours is going to improve. In fact, on the contrary, to cope with the soaring demand, more and still more areas are only too likely to be snatched away from the wildlife for agriculture or other developmental works. The long list of the threatened species of both plants and animals are alarmingly increasing with passage of time and the genetic stock is getting poorer.

The potential of the apparently innocuous plant and animal life-form is being constantly realised in the present time of genetical engineering, which may ultimately prove vital in keeping the humanity viable, specially in the context of diminishing and already depleted natural resources, particularly the renewable resources. The realisation of this fact seems to provide the silver lining for the otherwise dismal field of conservation because man is utterly selfish, and can go to any length for his own self centered interests.

However preservation or conservation of wildlife is to be an all-embracing effort to achieve success. Unless the entire populace is properly oriented and adopts conservation in their lifestyle itself, any amount of legal protection and even proper execution of the concerning laws and rules are bound to give only marginal result - may be in the areas, specially constituted for the purpose. I don't intend to belittle the hard earned achievements in such areas by any way, but want to impress upon the point that unless we can extend this achievement into the other habitats which are providing us with the essential and much needed natural resources, the sad state of depleted status position of wildlife shall never improve. This means we shall be kept deprived of some of the resources, because of their threatened and critical status position, when we may need them most.

On the other hand it is much simpler said than done - orientation and motivation of the common mass, because of very practical reasons. A poor man, who may stay by the side of a wildlife area may already know why he has to preserve wildlife, but may turn to be the chief source of scourage, when in a few hours his ripening crop is devastated by wild animals or his only pair of plough animal is preyed upon by a large cat and he stares suddenly into a shattered economy. Since he may have only marginal land holding, if at all, and a number of months to feed, his immediate pressing problems may turn him a bitter enemy of wildlife. I have come across many incidents where the only earning family member has been killed by a Tiger or Elephant, thus shattering the viability of a full family. It becomes futile, or even inhuman at times, to say that the dead person was actually at fault, and not the deprading animal or the family had encroached upon the animals' habitat, which is very often the reality. In fact, it is the most toying and tricky moment for a wildlife worker to talk to the lamenting, bereaved family members.

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When we have to have special wildlife areas for preserving wild animals, we owe certain responsibilities to nullify the probable damage caused to the property and sometimes even to human life by the wild animals in the neighbouring areas populated mostly by poor to very poor people. Otherwise such people, who actually matters most, are only too likely to lose any sympathy for preservation, because their very existence is threatened. It is quite easy and sounds only sensible to take to preservation by the urban people but it is a completely different story to take up wildlife preservation for the rural people, who may reside by a wildlife area and make a co-existence with the wild animals.

Naturally the 'Dés and 'do nots' of living in conformity with the needs of preservation of Wildlife has to be taken up as a lifestyle for the rural people. And in doing so it can easily be realised what phenomenal wisdom our ancestral society builders had acquired in the ancient ages to prescribe various social and religious customs and traditions, all of which had a bearing on guarding against over exploitation of natural resources. The serious probable consequences of such over exploitation had been clearly realised even in those forgotten days, though it remains still a mystery how this uncanny realisation had dawned on them. Our ancestors had been a true "Ecosystem" people and had devised norms to sustain the human society in perfect harmony with the ecological balance and with the natural resources providing the store house of their life supporting supply systems, without being depleted.

But with the advance of civilisation and scientific advancement, specially during the last couple of centuries, our people started to gradually shift from our traditional social and religious ways of life on the plea of those customs and traditions being based on superstitions. There is no doubt that some of the customs had really been based on superstitions, which would be due to motivated persuasion of some pseudo-society builders' interests. But that was hardly any judicious basis of discarding the invaluable traditional customs. Which gradually and imperceptibly, though unerringly, has brought us to the brink.

SOME STRAY THOUGHTS ON "WILD LIFE "

Sri S. Deb Roy,
Field Director,
Project Tiger.

Conservation of Wild life has evoked a lot of genuine global interest during the last decade or two and India can be safely considered as one of the leaders in this aspect, at least amongst the developing countries. That Indian efforts are recognised and appreciated by the entire world, is manifest in our late Prime Minister Indira Gandhi being awarded the prestigious.....award, which is one of the most coveted International awards in the sphere of wild life and nature conservation. In another remarkable development, Dr. Swaminathan, a noted Indian Scientist has been appointed as the Chairman of the I.U.C.N., which is considered as the highest and most important world body on conservation of Nature.

All these recognitions have come through untiring efforts taken to preserve wild life in India, which is one of the developing countries and where the conflicting interests of the wild life and that of humanity is constantly clashing, making the going tough at each step for wild life preservation. But even under the extremely trying conditions, when fixing of priorities and mustering resources, vitally essential for conservation of wildlife, on the face of growing demand for developmental activities could be really be very hard, our developing country could achieve some of the most remarkable objectives in the sphere of conservation under the stewardship of a conservation-oriented leadership and the dedicated hard field work put on by a properly oriented and motivated band of tough wild life field staff.

The spectacular success of Project Tiger, acclaimed all over the world as the most successful and the largest ever wild life conservation project

anywhere in the world, a whole-hearted attempt to save the elephants, the starting of the Wild life Institute and many other similar but smaller Projects testify for the efforts and the strong will to back such effort in India.

But in the broad view of the conservation these efforts do not seem to be enough, if one considers the state of conservation that prevails in the country, outside the exclusive wild life preserves. There will probably be hardly any dispute if one comments that the state of wild life conservation in areas other than the wild life preserves is practically lamentable. There may be a few happy exceptions here and there but these exceptions probably prove the general rule of the day. The wild life status in most areas stands sadly depleted, habitat destroyed, in many cases transformed uninhabitable for indigenous wild life by way of inducing monoculture of alien species for economic reasons and also unabated poaching either for protein or for economic gains. The alarming report that satellite photos reveal an annual loss of 1.3 million hectares of forest cover, which naturally is a direct loss of animal habitat will naturally cause no end of worry to the conservation oriented people of the country, and for genuine reasons.

Naturally with this rather alarming state of situations at the backdrop, it is about time to put all the shoulders to take up the challenge that is posed. There is no necessity to discuss why we have to save the wild denizens. This has been realised, though quite late, that we have really no other option for the sake of the future existence of our own race. This fact has been realised and continues to be realised that human life and its existence is intricately interwoven with that of wild life forms, both animal and plants, specially at this crucial juncture, when human population in our country is literally bursting at the seams and their demands for development is pressing the wild life resources with their backs to the walls.

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The Indian Tiger appears to have been hit ^{yet} another near fatal body blow by the near wild course of ^{recent} politics that has encompassed the largest democracy of the world. Well, one may wonder how ~~the~~ and when the poor Tiger had entered politics? He (or she) never voted or never ever aspired to become a peoples' (Tigers'?) representative, and so how does he gets entangled into the mess called politics?

Well may be not quite, at least directly. But those who would write or write off the fate of the Tiger, has ~~now~~ ^{more} important things to sort out. They have to make sure, they ^{themselves} survive. If the Tiger is still alive, it's welfare ^{acceptable &} conducive to Man's development, may be granted a look again. So the Tiger has to survive the next "Elections", and that's how he has unknowingly taken a plunge into politics!

The importance of political will or ~~reverse~~ the lack of it strongly influences ~~the~~ Tiger - a symbol of wildlife and the natural ecosystems ^{in India}. Few other countries in the world must have witnessed both these sides so clearly and in ^{such} contrast during a short span of less than two decades. Vohams have been talked about this all-~~obscure~~ ^{obscure} power behind the screen, which makes or mars the conservation avarna but with just no result.

But we have to keep our hopes alive, is not it! So let us hope the next election results will present us with the elusive magic wand. ~~The~~ Tiger, the superlative survivor, should only stay alive till then.

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A NOTE ON WILDLIFE IN INDIA

The following points relating to wildlife preservation requires to be looked into and necessary steps taken up to improve the situation.

1. The requirement of funds for wildlife management is grossly inadequate, because of which only some selected protected areas are now being covered by central assistance. The State Govts. in general always complains of shortage of state funding to give proper attention to the protected areas under their respective control. As a result a large number of such protected areas are really not attended to, though maintained in paper as P.As. The inception of eco-development plan and the project elephant will call for quantum increase in funding towards wildlife management in the country. International assistance and assistance from private sectors may probably be thought of as a remedial measure. Besides no proper priority and urgency is felt to be involved in national planning for this all important aspect of biodiversity conservation, which shall assume unlimited importance in a very short future with the projected human population rise, that is expected globally within the next quarter of a century. Unless this fact is realised and measures taken up by the national planners on proper and justified priority basis, we are not unlikely to erode further into not only our present status of stock, but are also only too likely to even lose invaluable genepool resource conservation *of which* must be granted place amongst top priority items of national planning.

2. Quite often it is observed that the State Govts. are very nearly oblivious about guarding true wildlife interests, though there are few rare and happy exceptions also. The Central Government is often confronted by the various State Govts. as an imposer, mainly because it wants to guard wildlife interest in the field, which very often may clash with immediate human interest. Though most of the major policy decisions are arrived at by the Central Govt. only after due consultation with not only the State but also with various Govt. of India departments. This naturally causes tremendous difficulties and is totally derogatory to wildlife interests. There are numerous instances of various State Govts. violating norms set up by the Govt. of India and agreed to also by the

States. It will thus appear, though the State Govts. invariably claim their own motivation and involvement in wildlife management, the same is mostly restricted in paper only and not reflected in action in the field. Even trifling matters like posting of suitable persons and releasing 100% central assistance through State budget to the respective protected areas are not done properly.

In effect lack of priority and neglected of conservation values, as opposed to so-called "Development" projects are so apparent that wildlife related jobs/works are left with no takers, except for few who are extremely dedicated and may like to slog it out. Naturally often such posts (wildlife) are misused for so-called punishment posting or a stepping stone for someone, whose promotion is due but appropriate post is not available at that moment. Such problems are very old and repeated attempts by the Centre has so far failed to evoke proper response from the States (most), though there is no dearth of lip-service.

3. In this same line there are numerous examples, where the various State Govts. have taken the pleasure of removing wildlife staff to non-wildlife posts, because of the apparent reason that such officers had taken a right stand in favour of wildlife interest, which more often than not may infringe immediate human/political interest. There are known examples, when such forth right (and may be uncompromising) officers have been not only transferred, but even have been victimised later in their service career by debarring them from timely and legitimate promotion on some flimsy grounds. All such activities, indulged in by the State Govts. stand as dead weightdrag against the interest of wildlife management. Unfortunately, though forestry and wildlife is in the concurrent list, yet such unbecoming happenings remain out of touch and control of the Central Govt. Even when the provisions of the Wildlife Act is willfully and deliberately violated on the plea of reverence of so-called tribal interest, the Centre is rendered to a helpless onlooker!

4. On the face of all these, the States are demanding more decentralisation and Govt. of India has in fact, conceded to some such demands. But unless the approach of the State Govts. is right, I am afraid wildlife interests will stand for yet more battering. But in the same breath let me clearly point

out that if the approach of the State Govt. is right, we may expect even better results from decentralisation, as it will always be the States who shall have to manage their own renewable resources, be it wildlife or forest and it will be them who are able to translate decisions being appropriately implemented in the field. In effect state Govts. shall have to be made to understand this role in nature conservation and act accordingly.

5. There is just no system to give due recognition to good works done in the field of wildlife management, though there are numerous regulation and extra-regulation ways to punish offenders. Good/very good works often are not only taken too casually, but in the forest deptt. there is a tendency to weigh it down, apparently for tangible reason. The P.C.C.Fs. and other senior officers in the forest deptt. are to take the blame squarely. Officers and even lower rung field staff, who have to take the burnt of a extremely hazardous and difficult life, if they have to be honest and maintain professional integrity, should be rewarded in time, which will help in continuing with their noble pursuit. Like the defenders of our sovereignty, these people who work behind the spotlight are also doing the same type of job by protecting/defending the natural heritage for the future generations and are in no way any inferior.

6. In the field of wildlife preservation, I have observed, infrequent success is always personality oriented. The process of wildlife management has not so far been institutionalised, at least in our country. The crux of the key to success seems to be true leadership, which is capable to instill confidence in the field staff, build up their moral and sustain efforts. The works of the wildlifer is rather unorthodox, as it is rigorous, which probably makes it imperative that he will have to be totally dedicated, maintain total professional integrity and endure. Failure, which is most common, must not deter/distract him, he should not succumb to any temptation. His work schedule has to become his life style, which he should enjoy. This is easier said than done. Understanding wildlife ecology is probably one of the most difficult jobs at hand and no amount of academic education or training can be any substitute to practical experience. And a full lifetime, not to speak of a service life, is just not enough to understand the highly complex cobweb of life line created by nature

in our highly dynamic natural system of infinitely complicated energy conversion and recycling. We may simply try to protect this from human induced overuse and abuse, which set up the conflict of interest with man for his shortsightedness and unsustainable demands on the nature.

7. Naturally under such circumstances, wildlife conservation/ preservation has become a highly specialised profession. But this point is generally not understood in the right perspective. A forester who basically still continues to attempt to manage really the human demand, rather than manage the growing stock on a sustainable yield basis, may be, governed naturally by human interest and demand, manifested through social, political, economic and even bureaucratic compulsions. He will naturally not easily be able to adopt wildlife conservation/ preservation principles, unless he may have some earlier orientation by some rare coincidence. In all probability, when assigned to a wildlife post, a forester will render his normal quota of "Government Service" and seek the earliest opportunity to quit. Well the demands of wildlife conservation on an officer of any level is much more than what is expected of a normal Government service holder, a forester.

8. Besides, the post of Chief Wildlife Wardens are of the level of Chief Conservator or Additional Chief Conservator of Forests. Naturally, there is very little scope for looking for any suitable person. Often the last promotee in this rank adore this important post, which has all the statutory powers under the Wildlife Act. I have known persons who became C.W.L.W. on promotion, without any previous experience, and worse still, with an aversion for such job! He would naturally await the first opportunity to be bailed out as quickly as possible. It is easy to realise that wildlife interest can hardly be served under such an impractical system.

9. An old debate continues, as to whether wildlife management should constitute a new and separate independent service, which may bring it out of the evil influences of the forestry. Well, I have never agreed to this view and continue to do so even now. Truly speaking, every forester should be subserviant to wildlife interest, without which he cannot do any justice to the noble profession. Gone are the days of "affluence", when the foresters could have indulged in experimenting and even squandering some part of his growing stock, which seemed nearly inexhaustible, when hardly any species of animal was scarce, which could offer him the luxury of hunting or harvesting. Now he has to put all his efforts on saving the last blade of grass and the remaining animals, which have been scarce/rare, for the sake of retaining the generally declining natural productivity. I don't feel there is much difference in the work ideology of a forester and a wildlifer. But as expressed earlier, the wildlifer has to have extensive experience and motivation to do any justice to his duty. He cannot afford to look elsewhere. Thus, it appears to me that the wildlife wing should continue, as a part of the forestry service. But the personnel manning this wing should be carefully selected in the very early stages of this service life, as per their willingness and should not be transferred out quickly to other working areas. In the forest areas, other than protected areas, we still have considerable wild animals. The forester must be induced to take interest in their proper management and welfare. The working plans should prescribe definite management practices, attuned to wildlife interest, though the management in such areas may not be as specialised as in the protected areas.

10. The Chief Wildlife Wardens must be selected from people who had experience in wildlife management. The status of the level of the post need not be rigid. If among the CCFs/Addl. CCFs none is found competent, some one from the conservator level with requisite experience and knowledge about wildlife may be selected. More emphasis should be given to utilise the training courses in wildlife, run by the Wildlife Institute of India at Dehradun to have sufficient number of officers of all level, so that there should be no problem in finding a substitute, when necessary.

The field staff engaged in anti-poaching works are generally badly handicapped, not being properly equipped to tackle the dangerous armed poa-

chers. The professional big time poachers who go for Elephants, Rhinos and Tigers for high stakes are normally armed to the teeth with automatic fire power. The antipoaching staff are actually no match to such outlaws, who are least hesitant to kill. The occasional success in nabbing some of these poachers is mainly because the area, terrain and cover conditions are known much better to the field staff and the more daring of them may sometimes ambush the poachers and nab them, purely taking them by surprise. Naturally such incidents are very rare and probably touches only the proverbial tip of the iceberg.

I feel it should be considered whether we should arm our anti-poaching field staff adequately to combat such dangerous poaching groups effectively. At present in some States arms (only shot guns and .315 rifles) are provided to some of our staff, which is grossly ineffective. But providing automatic and sophisticated arms to such field staff will involve proper training, as also adequate legal coverage. Enforcement of the law and antipoaching will otherwise be impossible, as people have lost their traditional respect and fear for law in general. Besides, collection of adequate information through clandestine intelligence lines should be developed without which the highly secretive operational movement and activities of the smugglers and the poachers is very difficult and rare to come by, though maintaining cordial relation with the surrounding village people may be helpful.

At present we have only 4 Dy. Directors in 4 regions of the country to control the smuggling of contraband wildlife articles. There are only three more Assistant Directors and a handful of inspectors under them for the purpose. But in a large country like India with numerous outlets left unguarded, the purpose is actually hardly served. This network has to be strengthened considerably and spread all over, in line with the customs network to be able to achieve our objectives. I had submitted a plan about this for upgradation of the Dy. Directors and to have more Dy. Directors, Asstt. Directors and inspectors. But the same had not been accepted on financial reasons. I strongly

feel that such attitude will lead us only to earn blame for the failure. It will be considerably better to create a state network of such enforcement machinery, who will be able to deal with the local problems, as the central agency is mostly deployed in the metropolitan areas, in the airports or seaports from where export of such articles generally take place. It will be obvious that if such contraband is sent away from other areas, nothing is likely to come to notice.

Besides any internal use or trade of such articles are only too likely to go undetected.

Peoples' participation in all forestry and naturally wildlife matters has now attained very high priority. In this context involvement of N.G.Os. has so far failed to evoke correct response from most field officers. The blame for this unwelcome situation lies on both sides, but usually each blames the other, instead of trying to reconcile. And the Chief reason appears to be a silly clash of ego. The Forester probably finds in the N.G.O., who is an unwelcome intruder, if not an imposter, who are upto erode into his authority over his "territory", which he is finding, even otherwise, increasinly difficult to retain or defend. On the other hand the N.G.O. almost always finds the wildlifer manager to be an obstructionist, not knowledgeable enough for his job and an authoritarian. He also suspects that the wildlifer does not like his presence, because his failures and corruption become vulnerable to be exposed. There are only few examples of the N.G.O. going hand in hand with a wildlife manager.

This clash of interest between them have to be eliminated or at least narrowed down, because both have the same objective. This factor is of very high importance but I feel, will take a lot of endavours to tackle the problem. Forestry and wildlife management involves a lot of personal factors, though institutionalised and hence factors like clash of ego etc. cannot probably be resolved so easily, which has its adverse effect. I feel Govt. of India would do well to concertrate on this matter seriously and attempt to remove the sore-points.

The status of management of wildlife and the projected figure (census) of the status of the wild animal population has come under serious

criticism almost all over the country. The figures are strongly contradicted by various persons, who claim to be knowledgeable in the matter. The number of tigers, or other species about which periodic regular census is taken in an approved way, in many areas, as projected by the wildlife manager has come under serious doubts and criticism. This doubt has to be dispelled by taking a very careful look, at least at some selected areas, by some experts.

Taking census of an elusive and lone-living species like tiger is anything but easy. There is no way, still devised, to go for a direct count of the tigers and only indirect method of census is carried out, basing on ground evidences. During the late seventies and most of the eighties the methodology was reasonably perfected in most of the Tiger Reserves, through experience and repetition of the process. The field staff of the core area of any Tiger Reserve has to monitor the movement of the tigers within his area continuously right round the year. Naturally in these areas the field staff are generally conversant with the tigers and their approximate territories. This renders the actual census operation (of the tigers) not so difficult and should produce relatively accurate results, if the overlapping movement of some of the tigers and the difference between the pug-mark impressions between the Tiger and the grown up Leopards are properly checked and probable duplication or over-counting is avoided. Obviously this requires experience and continuous practice by the field staff.

But I am afraid, there has been some laxity in this. Due to transfer of some of the experienced and knowledgeable officers from such areas, the continuity of operation and the experience that had provided the accuracy and confidence has been lost in some areas. Besides, none in the field is prepared to accept that in his jurisdiction the number of tigers has gone down, compared to the previous records. But this may and will happen even if the areas are managed very efficiently and poaching is completely eliminated, which seems to be near impossible. The population curve in any species will mark a rise, responding to efficient management of the habitat/ ecosystems, but when approaching the carrying capacity, will fluctuate for

some time before stabilising in a more or less rough straight line. Then again natural factors will have their own effects and the line may fluctuate temporarily, which is natural.

In a census finding out the exact number of animals is extremely difficult, if not impossible, and is actually not of any high importance. More important is to have the sex ratio and the age gradation, which provides the clue, through population dynamics to the true status of the species or animals, whether the same is ascending, descending or static in status whether its natural breeding potential is being achieved, whether its survival percentage is normal etc. Successive census can also indicate, in the long run, about any genetic problem creeping in, their dispersal etc., if the population is truly monitored.

The census of ungulates in dense undercover is still more difficult and no standard method may be applicable throughout an area uniformly, where diversity of habitat is existent. Only population estimation depending on concentration in various habitat types may be possible. The relation between the population of predator and prey species may provide a good clue to verify the acceptability of the population of both the types of animals. All such exercise had been carried out in at least some of the core areas of the Tiger reserves and with good results. Even international wildlife experts had checked up such results and had expressed their satisfaction about such results. Doubts and criticism had raged during the late seventies also, but had been thus contained. I do not see any reason, why this cannot be done again.

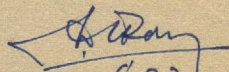
There are various unconfirmed reports about poaching of various animals, specially of the tigers in the north and tuskers in the south, making the round. Though reports from the state do not support this, yet some element of truth in such reports should not be ruled out completely. Smuggling of contraband animal articles have been detected now and then, which provides credence to such reports. It is learnt that tigers bones are in great demand in China and fetches exorbitant price. Some cases of attempted smuggling of tiger bones and also pelt had had been detected by customs/wildlife staff. This matter needs serious probing. We cannot be complacent just because the number of tigers in the country has marked a spectacular rise since the inception of the Project Tiger.

Proper ecological evaluation of the status of habitat and the population of wild animals in selected areas should be carried out by some unbiased expert, who may be accepted by all. Such evaluation will automatically involve participation by the local wildlife staff. Some N.G.O./N.G.s. may also be involved in the same exercise. Since a celebration of completing the 20 years of project tiger areas should be taken up as quickly as possible, even though such exercise may not be possible before the next winter.

Project Elephant requires an immediate thrust. Constraints of required funds will not be accepted as a reasonable excuse for those who have already started criticism about localised approach of the Govt. of India. Initiation of ecodevelopment planning has been taken up mainly in the Tiger reserves, which are the focal points of the problem. The same plan will have to be extended into the Project Elephant areas also, which has been already built in the project. The earlier it is done, is better. A Project Director with a skeleton staff will be obligatory to get the scheme rolling.

C.B.S.G. is making a strong bid to establish ~~this~~ ^{their} roots in our country to take up captive breeding of various endangered species of wild animals in a considerable scale. Captive breeding of endangered animals is wrought with many controversies and difficulties. I myself do not find enough grounds to support this move, as I believe, captive breeding of endangered animals is an attempt to save a species in isolation of its natural habitat, where the species had been evolved. This may be an ex-situ conservation attempt alright, but it will fail to achieve the objectives of "Conservation" in general times, particularly in the back drop of the current concept of biodiversity conservation. Yet we may and should attempt to attempt captive breeding of the zoo stock to have a viable population of such animals. This matter may be effectively dealt with by the zoo authorities of India. Zoo management in the country, however, remains to be upgraded in a big way.

Lastly the wildlife wing in the Ministry is badly understaffed. Though various new works are being undertaken, there has been no addition and even the sanctioned capacity remains almost half filled. This requires immediate attention, specially in view of the ensuing Parliament Session.


30.6.92

North - East on the edge.

A naturalist who might have seen the North Eastern States of the country about 100 years back, most likely would have shuddered, if he would see the same areas at present. The change, during the last century, in the conditions of the natural forest cover has been dramatic. The depletion has been so complete that some of the timber-based industries are now dependent on their existence solely on raw materials being imported from far away Malaysia, a situation which was far out of even remote imagination even a decade back.

So called development has gripped the area in a feverish mood and the renewable resources of this zone, where the complicated eco-systems was one of the most fragile types, have been ruthlessly sacrificed at the alter of "Development" without any consideration of the looming danger, which may engulf the future of homosapiens here. The reasons for such sad decline in status of ecological balance are multi-fold, but stems from mainly human urge for development and improved living conditions. This has resulted in overuse and abuse of the renewable natural resources and the catastrophic results have already started surfacing in the shape of unusual floods and periodic local drought conditions in many areas. The result is, untold loss of agricultural products productivity, public property and even human life. The magnitude of such misery is rising every year and the State Governments have been forced to approach Government of India with begging bowls after every wave of such natural calamity, which is a result of our own past undoings, against the unwritten law of nature or ecology.

To analyse all the aspects, leading to the present conditions in this zone, will involve a detailed study of the past human interaction with nature, which will take a lot of space and time. I will concentrate on only one aspect in this paper and attempt to analyse partially one of the main reasons.

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In the plains of Assam the fury of annual floods is the most severe and damaging, which is costing the nation to the tune of hundreds of crores every year. Invaluable financial resources, which could and should have been utilised for improvement of living conditions has to be diverted to smoothen the destructive effects of floods, which in other words, stalls development. But in the plains of assam, we still retain some natural cover, though may be inadequate, and the situation could have been slightly better, if the catchment areas of the numerous rivers and streams would have retained adequate clothing. Actually, the misery of Assam is flowing down the streams of the adjoining hill states, which surround the plains of Assam on three sides. And this is because all these hill states surrounding the State of Assam have successfully decimated the natural cover to such an extent that in many areas mother earth lies bare of any clothing. The top soil has been washed down in most areas and what is being washed down now is unproductive sandy earth, which is raising all the stream beds, adding to increasing fury of annual recurring floods.

As a short time and short sighted measure most rivers including the mighty Brahmaputra has been provided on either side with earthen bunds in all the potentially vulnerable areas, with predictable results. Often such bunds or embankments are breached with perilous results of unprecedented inundation of agricultural land. when such floods recede, the agricultural grounds are found covered with sand or rough soil cutting down the scope of possible agricultural production. As a result of continuous siltation over long period of time, the water table in many areas has lowered, indirectly effecting the agriculture.

Due to degradation of forest cover in the watershed, more and more areas are getting flooded in such areas in the plains where flood was earlier unknown. The extensive areas under the districts of Golaghat and Nagaon in particular which are being inundated for the last couple of years had never been flooded in earlier days. And the reason, if one wants to seek, is not far or difficult to trace.

But let us shift our gaze to the hills where probably some scene is being enacted, as a result of which the plains are getting devastated. We have resorted to taking various measures like Social Forestry, Waste Land Development and the like in an attempt to restore the lost ecological in other words natural, conditions. The effects of all such efforts should certainly make some amends. But I am afraid, unless we are able to treat the watershed areas up in the neighbouring hills, all our attempts to restore the natural cover in the plains may not be able to usher in the desired effects.

So, let us have a look to the reasons behind the devastation of the natural cover in the neighbouring hills. One of the chief factors, that may probably be traced as the main reason for baring of the hills is Jhoom cultivation or shifting cultivation or slash and burning. Arguably this primitive method of agriculture in the steep slopes may be the best method of deriving maximum agricultural output without offsetting the natural forces, very much, if a proper cycle (time gap between two successive jhooming in the same place) could be maintained. These hills had been sparsely populated till the last century and hence the process of jhooming did not inflict any tangible damage to the natural cover. But gradually the population rose and to feed the increasing population intensity of jhooming also naturally rose steeply. Increasing pressure for food resulted in lack of availability of sufficient land for jhooming, thereby forcing reduction of the jhooming cycle. The position at present is so acute that in most areas the cycle has been brought down to 4 to 5 years compared to minimum required period of 35 to 40 years.

Once a jhoomed area is abandoned by the shifting cultivators, such areas get covered by secondary forest cover, where bamboo is one of the chief plants along with other trees and also grass. During the interval of two successive jhoomings at one place, this secondary forest cover gradually advances in the stage of natural succession, through the interaction of non-living and living natural resources, with the aid of environmental factors, the top soil is enriched.

But with drastic reduction of the cycle the required process may only be able to start the process of revitalisation, when the axe is grinded again followed by induced fire, which offers no chance to the soil to recreate the fertility, so important to support life. With every re-creation of jhooming the productivity of the land keeps plunging down. In all the hills due to this impoverishment of soil, the output of jhooming has declined drastically inducing people to go for newer areas.

There is only very marginal land at present in the hills where jhooming has not taken place. In all such areas of the hill states, there is a very small percentage of Reserved Forests under the strict control of the respective forest departments. In comparison to this small proportion of Reserved Forests, there exists a large extensive area as private or community land, where forest cover existed. In many areas, the forests are also controlled by respective District Council authorities under the power offered to them through the 6th Schedule. On such areas, the forest departments have just no control, whatsoever. Silvicultural practice for management of such forest areas is practically unknown and the sole and only activity is to exploit the produce and earn money. Jhooming also is rampant.

Under such conditions only few gained financial benefits at the cost of the nation, but these few are probably the ones who control the large mass of uneducated poor in the hills, who hardly can manage two square meals a day despite hard toil.

But as mentioned earlier, the scene was not like what it is at present, even 40 to 50 years back. There had been many traditional customs in the hills to save natural cover in strategic locations, even while practising jhooming. Areas along mostly the depressions between two hills were left untouched and such areas were regarded as "sacrad groves". Many superstitions such as any one felling trees in such areas would bring down the wrath ^{of God} on people, their neck would get twisted or such persons would get killed, had been strongly prevalent. During those obscure and distant past, when education

was rare, some clever and wise social chiefs had probably designed such ingenious ways of saving the life supporting exhaustible natural resources for the future.

But with half education spreading, people started to understand that such superstitions had no real life value and gradually started to ignore those, quite oblivious of the sublime noble cause for which such superstitions had been deliberately floated.

Though some of the hill areas do have other resources yet the main pressure came on the forest produce, which resulted in mushrooming of a large number of forest based small and large industries like Sawmills, plywood mills and some paper mills. The capacity of utilising the resources gradually far exceeded the actual sustained yield resulting into various malpractices and illegal removal of forest produce, adding to the denudation. The small state of Nagaland has probably more number of such timber based industries per unit area than any other region of South Asia ! No wonder, when adjoining Assam had been reeling under the 3rd wave of floods during last monsoon, Nagaland experienced a spell of drought !

The productivity of land in the hills has gone down, water retention capacity is on the wane there and the resultant effect on the plains is waves after waves of floods and flash floods, inundation of increasingly larger agricultural land and consequent silting up of the inundated areas with coarse sand and earth which also lower watertable.

Though the evil effects and the chain reaction leading to such degradation is now quite apparent and at least partially understood, yet hardly any reins have so far been put to unabated baring of the soil. Though in Assam commercial felling of trees has been banned since 1986, yet encroachers are clearing *jungle* cover illegally by force under indirect or even direct patronisation of some short sighted and self centered so called politicians. Nearly 1,75,000 hectares of thick natural cover along the interstate border areas have

been cleared by encroachers from the neighbouring states under direct patronage or indirect support from the sister State Governments, with the plea of border disputes. All these areas are situated on the vital catchment areas of various rivers and streams running through the flood plains of Brahmaputra or Barak Vallies and are Reserved Forest areas duly constituted during the British Rule.

There are even such instances where some of the State Governments had spent government grants to establish public institutions and in one case a Sub - Divisional Headquarter within such Reserved Forest areas. All this despite the so-called stringent Forest Conservation Act of 1980, which in many cases has stood on way to various developmental projects being undertaken in Assam.

The underlying object of such border dispute possibly stems from the availability of forest produce in such areas, which spins big money on one hand and subsequent conversion of forest land for agriculture on the other. And all this is certainly going to cost the nation very dearly. Most of these areas are only marginal land incapable of supporting good agricultural crop continuously as the top soil is going to be washed away from such areas, which are situated on moderate to steep slopes, within a few years of baring the soil of forest produce. The forest based industries in this region has already been nearly choked due to non availability of raw materials and the position is going to worsen in future years. The paper mill at Jagiroad is having a lot of trouble to obtain sufficient raw materials within few years of its installation and going into production. But all the same as a forester, one would probably feel that irrespective of any border dispute, real or imaginary such vulnerable areas within the Reserved Forests must be preserved by all concerned for avoiding future catastrophe, the beginning of which seems to have already been started. Naturally the forest based industries do not seem to hold any prospect whatsoever. There is hardly any other industry or any real scope of improving the economy of this region through industrialisation.

Thus there seems to be hardly any alternative but to judiciously utilise the renewable natural resources, the stock of which has probably dwindled to such low level that bringing the same up is now a stupendous task, specially on the face of the demand, which is soaring to keep pace with the increase in population. The age old customs had been broken on the face of such pressure and partially because we deviated from our age less and the invaluable philosophy of life, which now appears to be nothing but nature science in an attempt to adopt so-called modernisation.

But something must be done and immediately as time is running out fast with situation worsening every minute. The traditional ways of life in the hills needs a drastic change and I know what it means. But one must remember, time has changed and the same has happened with the scenirio and the circumstances. If we have to ensure our future existance, we are probably left with no other alternative but to adapt to the changed circumstances.

The 6th Schedule, a generous gift to the hills, meant for exercising their own rights and power over the natural wealth, has unfortunately resulted in plundering of the same, which has not only impoverished the land, but has now stood as a big question mark against the very existance of man in this region.

All this requires thorough study and proper evaluation, basing on which we may be able to evolve some ways and means to sustain ourselves without overusing our natural renewable resources. It is a sad state of affairs in this region that while truck and trallor loads of Malayasian timber is being carried into Assam to sustain the timber based industries, truck loads of timber, mostly immature, is being simultaneously brought down from some of the neighbouring Hill States as produce of private or community land and transported through Assam to other areas. The Central Board of Forestry has recommended during its last sitting that tree felling should be banned throughout the country and rightly so. Naturally, we cannot, probably, afford to make any exception, even under the generous provisions of the 6th Schedule.

The hills and the rivers are the true life supporting natural systems of our country. Our wise ancestors had revered both and worshiped those for good reasons. But we have abused and plundered such treasures, which is bringing down owe and misery.

Consciousness about this danger has been aroused in the western part of the country, but the east is still blissfully asleep. N.G.Os. can go a long way to arrest the slide by properly briefing the government in the right direction. Few are actually aware of the real danger looming ahead. The lure for easy money and lack of alternate resources, coupled with the rich climate which produces lush green cover in no time is fooling most. One should understand that nature had evolved the intricate and most complex eco-system in this region to protect and nourish life to eternity. Putting this highly complex system out of balance is suicidal - for whatever reasons there could be.

The only long term solution to arrest the ravages of floods in the plains of Assam and also in the adjoining areas, probably depends on the treatment given to the catchment areas in watersheds of all the rivers and streams flowing through these areas. This will obviously call for an integrated Forest Policy for the entire North East Region, which only can ensure proper protection of the natural eco-system in the watersheds. Any piece meal endeavour in isolated locality is not going to improve the condition, except, may be, in a very limited space. This, naturally will call for an integrated and concerted efforts from all concerned States of the area, may be under central guidance. The situation is gradually drifting beyond control and even if earnest work is taken up right away in this direction, the result may unfold under a long period, during which time, we have no other alteranative ^{but to} to take up short term measures as is usually done. _^

The local demand of timber and firewood will have to be made under any circumstances, specially in the interest of the poor. Alternate source of energy seems to be a distant cry, although may not be impossible to arrange. Government will have to focus more attention to this point also. The Central Board of Forestry has called for banning all tree felling all over the country as mentioned earlier. It has gone to the extent of suggesting that the home requirement, if necessary, shall be made available by import. This does not seem to be realistic as in a developing country like ours, we do not have enough resources, even for our on-going plans. Both scientific and managerial points will have to be looked into to arrive at proper decision as quickly as possible.

Pressure on forest land in favour of agriculture in the State of Assam is going also beyond control. More than 10% of the Reserved Forests of Assam at present is under forcible encroachments.

WILDLIFE

The State of Assam is endowed with a richness of wildlife forms, the like of which may be unique not only in our country, but may be in the world. The extremely broad spectrum of life forms is doubtless a reflection of the wide variations in the habitat types. Although, the wildlife along with the natural habitat, is under a tremendous pressure, yet the history of preservation of fauna in Assam will appear laudable.

Two of the most famous wildlife preserves of the country are situated within Assam - Kaziranga National Park and Manas Sanctuary (A Project Tiger area). While Kaziranga can take pride about saving the home of Rhinos against heavy odds, Manas can take the pick position by displaying more than 20 species of endangered mammals, listed in the Schedule I of Indian Wildlife Act, in its rather small area of only 431 Sq. Km. Some of its endemic species are not available anywhere else in the world. No wonder,

Manas has been rightly listed in the prestigious World Heritage Site first in the country.

But the pressure on habitat and also on the wildlife by persecution is mounting. Till now, it has been possible to keep intending encroachers at bay by undiluted strict watch and strong action, wherever warranted. The Rhino bearing areas in particular are eminently suitable for wet cultivation and are most vulnerable to forceful encroachment. It is commendable that under such situation, the wildlife wing could maintain such areas out of encroachers' grasps.

But the story in the case of persecution is not so encouraging. The myth of unicorn and the related superstition of the medicinal and charm-value of the Rhino horn has been causing continuous worry to the wildlife wing. Due to soaring demand and consequent sky-rocketing of the price of Rhino horn in clandestine International Market, poachers find it the most lucrative under world business. Taking risk of life for the high stake, that is involved is now quite common for the poachers as the horn is almost as good as gold for its weight in the underworld market! The prolonged agitation in Assam probably had its first casualty in the protection of wildlife. During the troubled days, when the civil and police authorities had to be strained to the hilt for Law and order problems, protection of wild animals was the duty solely for the wildlife wing of the Government. Being badly understaffed and grossly ill-equipped at that time in many areas, protection measures became very ineffective. The worst example is that of Laokhowa Sanctuary in the District of Nagaon. This area contained 35 to 40 Rhinos in the year 1978. But by 1984, not even one was left alive here by the poachers. But during the same period, 10 times more number of human life had been lost in the District, which may testify the seriousness of the problems facing the Government at that time.

Poaching of Rhinos in particular steeply rose in other areas like Kaziranga, orang and Pabitora areas,

excepting the only area of Manas Sanctuary, where the average number of poaching did not increase, thanks to the field staff and their dedication.

However, since 1985 various measures have been taken to curb poaching and gradually, though slowly, yet surely the incidence of poaching has been possible to be arrested to some extent. Government of India has been generous enough to provide a special Rhino Protection Scheme, which promised an outlay of Rs. 5 crores in 5 years, ~~which~~ ^{There are} various other lesser but important schemes also, where Government of India's assistance is provided.

Government of Assam has also done their part by way of declaring 1781 Sq. Km. of the existing Reserved Forest areas as wildlife areas like Sanctuaries or Game Reserves under the Wildlife Act. Besides, the work of extending the Kaziranga National Park area by 454.506 Sq. Km. is also under legal process. The State Government is always keen to take utmost care for the preservation of wildlife, the solid proof being the return of the Rhino from the brink. It is estimated that the total population of Rhinos touched the rock bottom figure of just about a dozen in 1907 at Kaziranga. Now the Great National Park holds a population of around 1,200, despite the sting of the poachers !

The status position of the tiger has made a marked improvement in the State specially in the Project Tiger area compared to the early 70's. The status position of Swamp Deer (Bara Singha) has also improved remarkably in Kaziranga National Park and Manas Wildlife Sanctuary. The rarest of all mammals of the country, Pigmy hog - is doing extremely nice in the Manas Wildlife Sanctuary,

The population of elephant seems to be on the rise since 1978 when capture of elephants was stopped in Assam. In fact, we are having a very difficult situation to face due to widespread elephant depredation almost on all parts of the State. Such depredations is not only causing loss of human property but is also causing annual death of about 50 persons. The main problem of management of elephant is lack of sufficient suitable habitat for this great animal. On one hand, the population of elephant seems to be on the rise and on the other, we are losing the available elephant habitat to the onslaught of agriculture. It is unfortunate that ideal elephant country is ideal for agriculture also and the main point of conflict starts from there.

It is probably desirable to control the size of the elephant population in the greater interest of Management of Wildlife because it appears next to impossible to extend their presently available habitat. Even amongst the presently available habitat range degradation has set in because of heavy tapping of forest products in such areas. The paper mills which sprung up recently in the State are procuring huge numbers of bamboos from the secondary forest areas (after jhumming) of the hilly areas of the Assam. Such areas were perpetually good habitat for the elephants during the monsoon. With destruction and tapping of these hilly slopes, the elephants have found themselves in tight situation which is causing even more degradation during the recent times.

While elephant population has marked a steep decline in most of the other habitats of the country, the situation in Assam seems to be rather encouraging on the one side but causing serious problems on the other. This will require proper management policy to be adopted for this great animal as otherwise the very purpose of management of this species may get jeopardised, once the limit of patience of the extremely tolerant people of Assam exceed the tolerable limit.

Government of India has been appraised of this dangerous situation time and again. But it appears that Government of India is very reluctuant to realise the very serious situation of the practical aspect of Wildlife Management in the case of elephant.

A plan to introduce the Sanghai (Brow Antler Deer) of Manipur is under active consideration under the Ministry of Forests, & Environment, Government of India. It is well known that Sanghai is fighting its last desperate battle in the Lake Laktak and in some adjoining areas. The total number of such deer has fallen to a meagre number of around 50. Over and above that Laktak Hydrel Project has seriously endangered the present available floating habitat (forced) of Sanghai. In simpler words, the future of this deer in the wild seems to be doomed. A technical study of the vegetative cover in the natural habitat of Sanghai in Manipur and an area named Pabitora in the District of Nagaon in Assam has already been finished. The two datas as also other environmental factors compared quite favourably which is really very encouraging.

If and when this project comes through and becomes successful, it should be the first of its kind in India.

Wildlife Management in Assam hardly requires any canopy manipulation or even population management, except in the case of elephant, who does not have a natural predators. The fertilty index of this region is so high that the carrying capacity in relation to harvivours and naturally therefore of the carnivours is really wide. We have only to ensure stoppage of biotic interference in this area and leave everything to nature for the best management of the eco-systems with the life forms that are available there.

But the root cause of the problem of Wildlife Management in the State starts from the conflict of interest of wildlife and that of homosapians. Unfortunately in most cases under such unequal competition, mens' interest gets preference over the other. And this problem is not easy to overcome.

The Social Forestry programmes have been taken up in a massive way all over the State, wherever free land is available. But in an area, where agriculture is the basis of economy, land becomes a scarce commodity. Besides, I do not think, Social Forestry is the real answer to arrest the environmental degradation by causing destruction of the natural eco-systems of this zone. The extremely complex eco-systems has been designed by nature to preserve the ultimate productivity of the land. Unless such eco-systems wherever destroyed can be re-established, I am afraid, an artificial planting of trees under Social Forestry Programme, which is often unable to treat the watershed areas, will not be an answer to maintain the ecological balance of this zone.

The last point is - all these problems are interlinked and rooted to the main problem of the country (or the world), - the problem of population growth. There is a limit of population that can be sustained by the available extent of land and also the natural resources, both renewable and exhaustible. We have to take care of this, otherwise, the unfailing law of nature shall take its own course ruthlessly. We have to maintain a minimum extent of forest cover in any area not only to derive the produce on sustained yield basis, which is essential for human consumption, but also to sustain agriculture in other areas, which is dependent on sub-soil water regime and the top soil which gradually flows on to sustain proper productivity.

- S. Deb Roy.

DEFORESTATION & ECODEGRADATION DUE TO
SHIFTING CULTIVATION IN NORTH EAST INDIA

Deforestation & shifting cultivation are the twin major ecological concerns of the North Eastern Region. The region, which is forest rich, contains about one fourth of the forest cover of India and about two-third of its geographical area is covered by forest. Except for the Brahmaputra Valley and Barak Valley, the region is mountainous and hilly. In the substantial part of the Brahmaputra & Barak basin, forests have given way to agriculture long back and in the hills, shifting cultivation, locally known as jhuming, is the main stay of the local tribal population. Geographical isolation, remoteness, lack of infrastructural facilities have jointly contributed to the backwardness of the region. Though, in the post independent period, the region has joined the mainstream of national development process quite late, due to historical reasons, it suffers from developmental lag. In absence of other economic opportunities, the tribals continue with the primitive system of jhumming which results in substantial loss of forest vegetation leading to ecodegradation & loss of biodiversity.

It is estimated that about 4 lakh families practice jhumming in the region. As a result, substantial percentage of forest areas is open and degraded, thus incapable of fulfilling the ecological & environmental functions. In the five hill states of Manipur, Meghalaya, Mizoram, Nagaland & Tripura, 68 - 79% of forests are open/degraded forests. Only 22-32% of forests are closed forests, capable of fulfilling ecological/ environmental functions. On the other hand, about 75% of the forests in Assam & Arunachal Pradesh forests are closed forest and only 25% are open & degraded. Unfortunately, due to improved accessibility, high price of timber, difficulty in protecting such forests from mafia type timber poachers, such good forests are also rapidly dwindling.

Assam State has been practicing scientific forestry over hundred years, but same is not the case with other States. Forestry Conservation & Development works are taken up in Nagaland, Arunachal & Mizoram, only after sixties & seventies and a modest beginning has only been made. Substantial forest areas are privately owned or by the Community in Assam, Meghalaya, Nagaland, where uncontrolled timber-felling takes place for generating revenue to the private owners and the Autonomous District Councils. Deforested forest lands under Shifting Cultivation are outside the effective control of the State Forest Departments and no effective measures have been undertaken to manage these lands on scientific lines. With lowering of productivity of these lands, and increased population pressure fallow period at many places have reduced from 10-15 years to 4-5 years. It is essential that the problem of Shifting Cultivation is addressed adequately on priority basis. Efforts have been made in number of States to settle the jhumia families through appropriate packages like settled agriculture, horticulture, rubber cultivation, Farm forestry following an integrated approach. These initiatives need to be promoted and strengthened through enhanced financial support/appropriate planning.

North Eastern States are rich in regard to biodiversity and deforestation & jhumming also have adverse effect on the flora and fauna. It is reported that about 650 plant species, 60 animal species are categorised endangered by BSI & ZSI. Protected area network i.e. area under National Parks & Wildlife Sanctuaries is quite inadequate as it is only 2% of the total geographical area and 7% of the total forest areas as against the national average of 3.8% and 16.8% respectively. Considering the richness of biodiversity, this should have been ^{more than the} national average.

A large number of wood based industries like Saw Mills/ Plywood Veneer Mills established in Assam have heavily drawn on the timber resources of Assam and the adjoining States resulting

in deforestation and depletion of stock. So, much so, that now these industries have to meet their requirement through imported logs. It seems paradoxical that logs are being imported into a region rich in forest. It is felt that with adequate planning and sizeable investment in forestry sector, the degraded forests can be nurtured back to increased productivity.

The region receives high rainfall . Cherrapunjee and now Mawsinram is noted for recording the highest rainfall in the world. With Tropical monsoon climate, luxuriance of vegetation is evident every where. However, agricultural yield & productivity is quite low. Agricultural technology adopted by the farmers in the plains and the tribals in the hills, is quite primitive. Appropriate agricultural technology suiting to high rainfall situation for mass adoption is yet to be developed. Technology development by ICAR is high cost & labour intensive, which the poor farmers find it difficult to adopt.

Population explosion due to high birth rate and migration is exerting considerable pressure on the land & forests. The States of Assam & Tripura have high density of population which heavily depends on forests for their fuel wood, construction timber requirement. Poverty and absence of assured livelihood system tempts the rural poor to fell trees and sale timber/fuel wood, which have great demand, for eking out a living. Forest encroachment is on increase. Inter State boundary disputes have virtually left such disputed areas without effective control. As a result, substantial forests have been encroached upon. A recent study reveals that 910 sq km of Reserved Forests have been colonised by unauthorised encroachers in Assam - Nagaland border. Substantial deforestation has also taken place along international border with Bangladesh which needs to be effectively checked.

A. FOREST SECTOR SCENARIO IN NORTH EAST

- The region has 7% of geographical area of the Country but contains 25% of the Country's forest cover.
- 2/3rd of region's geographical area is covered by forest/forest vegetation (of which 53% is dense forest & 47% is open-degraded forest).
- About 1/4th of Country's dense forest is in this region and 1/6th of Country's dense forest is in two States of Arunachal Pradesh and Assam.
- The region is very rich in regard to flora & fauna and biodiversity. However, only 5% of the Country's conservation areas (i.e. National Parks & Sanctuaries are located in this region)
- Each of the five hill States of Manipur, Meghalaya, Mizoram, Nagaland & Tripura have about 75% of forest cover open & degraded category and only 25% are of a dense forest category.
- The States of Assam and Arunachal Pradesh have 75% of forest cover of better qualities dense forest and 25% only consists of open & degraded category.
- Substantial environmental degradation has taken place due to continuing deforestation in the hills and in specific in inter-State borders(due to encroachment & unauthorised colonisation process) and practice of traditional method of jhum farming.
- With opening up of remote areas & increased accessibility hitherto inaccessible forests have also open up. There is tremendous political & social pressures to over-exploitation & increased tree felling. Illegal timber felling & poaching is adopted in mafia type operations.

contd.

- Substantial forest areas are not surveyed, demarcated and are without scientific management plans. Bulk of the forest areas are owned by tribals/communities and are managed under customary laws. No land record system exist and unregulated fellings are resorted to make quick money without follow up regeneration of such forest.
- Forest protection, natural regeneration of forest and social forestry are important forestry development programmes.
- Integrated Watershed Development Programme is one of the important schemes of NAEB.
- People's participation in social forestry programmes have been very limited. SFD raised plantation on community/ clan lands with the understanding that villagers are to protect the plantation & share the final produce.
- NGOs are active in States like Manipur & Assam only. Other States do not have many NGOs.
- There is a Orchid Research Centre at Tippi in Arunachal Pradesh with Tissue Culture facilities. They are promoting orchid collection in small farmers sector.
- Rubber cultivation in Tripura under TFDC has become quite popular. Tribal rehabilitation schemes are important forestry sector programme in Tripura.
- There are two major paper mills (under HFC) based on bamboo resources of the region and a large number of medium to small plywood, veneer units and a very large no. of saw mills. These saw mills consume a very large quantity of saw logs which come from RFs, Private Forests/ Clan- Community forests.
- There is a Tropical Forest Research Institute (newly established) under ICFRE in Jorhat and a SFS & Rangers Training College in Guwahati.