

## Phytodiversity and forest resources of Kane Wildlife Sanctuary, Arunachal Pradesh, India

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### Abstract

The paper provides the vegetation account of the Kane Wildlife Sanctuary, West Siang district of Arunachal Pradesh. The preliminary study recorded 334 angiospermic taxa from the sanctuary, of which 83% is dicotyledonous and 17% is monocotyledonous. Of these 24 % are trees, shrubs 19%, herbs 42% while the rest 15% of the flora are contributed by climbers, grasses and epiphytes. Three less known endemic species *Globba rubromaculata* J. Lal & D.M. Verma, *Sadiria erecta* var. *longipetiolata* Giri *et al* and *Sonerilla arunachalensis* Giri *et al* were collected for the first time after the type collection with a gap of 50 years. The paper also provides first hand information on bio-resources of Kane Wildlife Sanctuary. The 25 edible plants, 29 timber yield species and other plant resources available in the sanctuary also have been discussed.

**Key words:** Arunachal Pradesh, Bio-resources, Kane Sanctuary

### INTRODUCTION

Sanctuaries are the naturally protected wildlife habitat under the aegis of Wildlife Protection Act and Indian Forest Act 1972. The main objectives of establishing sanctuaries are to provide *in-situ* conservation, which would help the biota to support all its life supporting system in a holistic manner. It can serve as a referral system for monitoring and evaluating changes in a natural ecosystem. However, there is a growing concern throughout the world about the natural resources management as these are being depleted and destroyed at an alarming and ever increasing pace. Arunachal Pradesh is one of the hotspots of megadiversity of the world. About more than 82 % of the geographical area is covered with forest, out of which 24 % is under protected area network and 38 % as unclassified forest (Anonymous 1999). To its credit the state has one Biosphere Reserve, two National Parks, eleven Wildlife Sanctuaries and 97 Notified Forests (Sinha 2008). The state has around 4117 flowering plants; these includes 545 species of orchids, 61 species of *Rhododendron*, 51 species of *Ficus* and about 452 Pteridophytes and 29 species of Gymnosperms (Baisya 2001). However the rich floristic resources of the state are depleting both quantitatively as well as qualitatively due to one or other reasons. In this process many species of plants are dwindling in their natural habitat and reached to threatened category. Information on floristic composition and diversity are absolutely essential in understanding the ecosystems dynamics which help in resource management (Hartshon 1990). Although, in past many attempts have been undertaken to explore the floristic wealth of the state (viz. Chauhan *et al* 1996; Panigrahi & Naik 1961; Panigrahi & Joseph 1966; Rao & Joseph 1965; Sahn 1969). However floristic account of many fragile ecosystems and protected areas of the state are still waiting. In the present paper an attempt has made to report the result of preliminary survey of the plant diversity of Kane Wildlife Sanctuary, West Siang district of Arunachal Pradesh, and the potential plant resources of the sanctuary so that necessary conservation measures can be taken.

### STUDY SITE

The Kane Wildlife Sanctuary (KWS) was established with the notification CWL/D/58/88/2507-56 of 11.9.1991. The sanctuary lies between 94° 72' E and 94° 102' E longitudes and between 27° 332' N and 27° 572' N latitude, encompassing an area of 55 sq km. The KWS is bounded by Likabali Forest Range in the north, south and west, while the Dipa Forest Range in the east. The boundary was easily determined by the two rivers namely, Inche and Inte, which flows around the sanctuary. Only one village Kane consisting of 15 – 20 households with total population of about 75 is present adjacent to KWS. The nearest approachable route to the sanctuary is about 14 km by walk from the main Likabali-Along state highway. The terrain is entirely hilly, broken by three rivers, Ghai, Inche

and Inte. All the valleys are created by these three rivers between the mountain ranges which are running in the direction of East and West. The entire terrain extends from the outer siwalik formation in the south to the high inner Himalaya in the north. The mountain slopes are steep and dense. Landslides are common in the steep slopes.

#### **Climate:**

The sanctuary experiences a tropical climate and three seasons (viz. summer, monsoon and winter) can be recognized in the area. The summer is less pronounced (April to May) because of early start of pre-monsoon rains; the rainy season (June to October) is quite long and the winter is prevailing during November to March. While July- August is the hottest period in the area, December – January remain coldest. The maximum temperature of the region is 35.7° C and the minimum temperature is 9.5° C. The sanctuary receives rain both from the south-west monsoon and north-east retreat monsoon. The southwest monsoon operates from May-June to September-October and the northwest monsoon accounts for the rainfall in the months of November and April.

#### **Humidity:**

Local environmental conditions and dense vegetation cover help to maintain adequately humidity throughout the year. Maximum relative humidity varies between 85 – 100 % during June to September and minimum 50 – 65 % during November to January.

#### **Vegetation:**

The sanctuary comes under the northern tropical evergreen and semi-evergreen forests. Due to high precipitation and high humidity, vegetation of the sanctuary shows a luxuriant growth. It has been observed that the species composition of the sanctuary is homogeneous without a clear differentiation to form different kind of zones. Based on the Champion & Seth's (1968) classification these forests can be grouped under the following categories:

1. Assam Alluvial Pains Semi evergreen forests
2. Himalayan Riverine forest
3. Sub-Himalayan High Alluvial Semi –Evergreen Forest
4. Secondary moist Bamboo brakes.

### **METHODOLOGY**

The study of KWS was carried during September 2008. The boundary of the sanctuary was defined with the help of forest map. To determine the floristic composition, 575 plant specimens were collected, brought to the herbarium, Botanical Survey of India, Arunachal Pradesh Regional Centre, Itanagar and processed into mounted herbarium sheets. Plants were identified using available literature. Data pertaining to the use of forest resources were collected by interviewing the local people using a suitable questionnaire. All collected plants have been presented in a tabular form. The quantitative value of the NTFP and forest products was evaluated by visiting the weekly market and state forest department at Likabali.

### **OBSERVATIONS AND DISCUSSION**

#### **Species composition**

The species composition of the sanctuary is quite unique. Although the different forest zonation is not recognizable in the sanctuary, the different storey in a particular forest type is easily recognized. The forest is more or less having uniform species composition. The trees occupied in the top storey are mixture of evergreen and deciduous species with tall, luxuriant growth. The evergreen species are pronounced more dominance than the semi-evergreen. The top storey mainly consisting of *Ailanthus integrifolia* Lamarck, *Altingia excelsa* Noronha, *Aphanamixis polystachya* (Wallich) Parker, *Artocarpus heterophyllus* Lamarck, *Bridelia retusa* (Dennstedt) Alston, *Canarium strictum* Roxburgh, *Chukrasia tabularis* A. Jussieu, *Cinnamomum bejolghota* (Buchanon-Hamilton) Sweet, *Elaeocarpus floribundus* Blume, *Macaranga denticulata* (Blume) Muell-Arg., *Phoebe goalparensis* Hutchinson, *Terminalis belerica* (Gaertner) Roxburgh, *Terminalia chebula* Retzius,

*Terminalia myriocarpa* van. Heurck & Mueller-Arg., *Trema orientalis* (L.) Blume. The proportions of the semi-evergreen species are more than the evergreen species. The middle storey consisting of *Albizia procera* (Roxburgh) Benth, *Baccaurea ramiflora* Loureiro, *Castanopsis indica* DC., *Careya arborea* Roxburgh, *Crateva magna* (Loureiro) DC., *Dillenia indica* L., *Desmos longiflorus* (Roxburgh) Safford, *Dysoxylum benectariferum* (Roxburgh) Hook.f. ex Beddome, *Garuga pinnata* Roxburgh, *Goniothalamus sesquipedalis* (Wallich) Hook.f & Thomson, *Gynocardia odorata* R. Br., *Heteropanax fragrans* Roxburgh, *Knema linifolia* (Roxburgh) Warburg, *Lagerstroemia parviflora* Roxburgh, *Mesua ferrea* L., While the lower storey is consisting with *Erythralium scandens* Blume, *Debregeasia longifolia* (Burman f.) Weddell, *Dendrocnide sinuata* (Blume) Chewin, *Itea macrophylla* Wallich, *Millettia pachycarpa* Benth, *Oreocnide integrifolia* (Gaudichaud) Miquel, *Saurauia armata* Kurz, *Saurauia fasciculata* Wallich, *Schefflera wallichiana* (Wight & Arnott) Harms, *Trevesia palmata* (Roxburgh) De Vis. The undergrowth is dense and consisting with evergreen species. *Ambroma augusta* (L.) L.f., *Amischotolype mollissima* (Blume) Hasskarl, *Baliospermum calycinum* Mueller-Arg, *Begonia hatacoa* Buchanon-Hamilton ex D. Don, *Chirita urticaefolia* Buchanon-Hamilton ex D. Don, *Chloranthus elatior* R. Br., *Chasalia curviflora* (Wallich) Thwaites etc. The most important bamboo that found in the wild life sanctuary and its adjacent region are *Dendrocalamus hamiltonii* Munro, *Bambusa pallida* Munro, *Bambusa tulda* Roxburgh, *Schizostachyum polymorpha* R. Majumdar. The most dominant shrubby species that are collected from the sanctuary are *Medinella himalayana* Hook.f, ex Triana, *Musa sikkimensis* Kurz, *Mussaenda macrophylla* Roxburgh, *Mussaenda incana* Wallich, *Myrioneuron nutans* Wallich ex Kurz, *Osbeckia stellata* Buchanon-Hamilton ex Ker Gawler, *Phlogacanthus curviflorus* Nees, *Polyura geminata* Hook.f., *Psychotria calocarpa* Kurz., *Sauropus trinervius* Wallich ex Mueller-Arg, *Difflugosa colorata* (Nees) Bremek. etc. *Hitchenia careyana* Benth ex Hook.f. is the most dominated monocot shrub in the sanctuary.

The dominant canes and palms that are present in the sanctuary *Calamus palustris* Griffith., *C. tenuis* Roxburgh, *C. erectus* Roxburgh, *C. floribundus* Griffith, *C. flagellum* Griffith, *Areca triandra* Roxburgh, *Livistona jenkinsiana* Griffith, *Pinaga gracilis* Blume, *Caryota urens* L., *Wallichia densiflora* Martius, While the important climbers of the sanctuary are *Ampelocissus divaricata* (Wallich ex Lawson) Planch, *Argyrea argentea* (Roxburgh) Choisy, *Cayratia pedata* (Lamarck) Jussieu ex Gagnepain, *Cesalpinia bunduc* (L.) Roxburgh, *Cissampelos pereira* L., *Cissampelopsis volubilis* Miquel, *Combretum wallichii* var *griffithii* (Van Heuck ex Mueller-Arg.) M. Gongopadhyay & T. Chakrabarty, *Dalbergia thomsonii* Benth, *Erycibe paniculata* Roxburgh, *Hedyotis scandens* Roxburgh, *Hoya globulosa* Hook.f., *Mastersia assamica* Benth, *Paederia scandens* (Loureiro) Merrill, *Thunbergia grandiflora* Roxburgh, *Tinospora cordifolia* (Willdenow) Hook.f. ex Thomson etc.

The ground flora is dominated with herbaceous plants such as *Aeschynanthus acuminata* Wallich ex DC., *Begonia hatacoa* Buchanon-Hamilton ex D. Don, *Begonia palmatum* D. Don, *Chirita oblongifolia* (Roxburgh) Sinclair, *Chirita urticaefolia* Buchanon-Hamilton ex D. Don, *Cryptolepis buchnanii* Roen & Schult, *Desmodium gyroides* (Roxburgh ex Link) DC., *Desmodium laxum* DC., *Gomphostemma lucidum* Wallich ex Benth, *Hydrocotyle himalaica* P.K. Mukherjee, *Lidernia anagallis* (Burman f.) Pennell, *Lidernia ciliate* (Colsmann) Pennell, *Lysimachia japonica* Thunberg, *Peperomia tetraphylla* (G. Forst) Hook.f. ex Thomson, *Pilea bracteosa* Weddell, *Tovora virginiana* (L.) Rafinesque, *Torenia thouarsii* (Chamisso et Schl.) Kuntze, etc. The monocotyledonous herbaceous plants represented in the sanctuary are *Alpinia nigra* (Gaertn.)

Burtt, *Amischotolype mollissima* (Blume) Hasskarl, *Colocasia fallax* Schott, *Commelina maculata* Edgewarth, *Commelina sikkimensis* C.B. Clarke, *Costus lacerus* Gagnepien, *Costus speciosus* (Koenig) J.E. Smith, *Disporum contoniense* Merrill, *Globba multiflora* Wallich ex Baker, *Gonatanthus pumilus* Engler & Krause, *Hedychium coccineum* Buchanon-Hamilton ex J.E. Small, *Hedychium ellipticum* Buchanon-Hamilton ex J.E. Smith, *Murdania nudiflora* (L.) Brenan, *Phrynium pubinerve* Blume, *Pollia subumbellata* C.B. Clarke, *Typha angustifolia* L. etc.

### Analysis of Flora:

Preliminary analysis of the plant diversity available within the boundary of the Kane wild life sanctuary, revealed altogether 334 species. The species come under 207 genera, 78 families. Out of 78 families the dicotyledons represents 83.8% and monocotyledons represent 16.2 % while the dicotyledonous genera represented by 78.7% and monocotyledon genera by 21.3 %. The monocotyledon and dicot family, genera and species ratio are 1:5; 1:3.70 and 1: 2.8; respectively. There are 81 species of trees, 65 species of shrubs, 143 species of herbs, 33 species of climbers, 17 species of grasses and 7 species of epiphytes. Table I indicates the break up of the 334 species and Table II shows the number of genera and species in respect of 10 first dominating family. The ten dominating families represented by 34.3% genera and 37.4% species which are collected during the study.

**Table 1.** Numerical analysis of the angiospermic flora found in the Kane Wildlife Sanctuary.

Category	Dicotyledon		Monocotyledon	
	Total	%	Total	%
Family	65	83.8	13	16.2
Genera	163	78.7	44	21.3
Species	246	73.6	88	26.4

**Table 2.** Ten dominant families represented in the flora of Kane Wildlife Sanctuary.

Family	No. of Species	No. of Genera
Rubiaceae	23	15
Poaceae	17	5
Zingiberaceae	14	4
Fabaceae	13	9
Urticaceae	13	10
Euphorbiaceae	10	8
Arecaceae	9	4
Commelinaceae	9	4
Cyperaceae	9	4
Asteraceae	8	8
<b>Total</b>	<b>125</b>	<b>71</b>

The family that are represented by single genus and single family are *Alangiaceae*, *Brassicaceae*, *Caryophyllaceae*, *Dilleniaceae*, *Ehretiaceae*, *Iteaceae*, *Primulaceae*, *Pandanaceae*, *Sabiaceae*, *Sambucaceae*, *Sapindaceae*, *Styraxaceae*, *Taccaceae*, *Theaceae*, *Thunbergiaceae*, *Typhaceae*.

It is interesting to note that, the sanctuary has many endemic plants viz. *Globba rubromaculata* J. Lal & D.M. Verma, *Sadiria erecta* var. *longipetiolata* Giri *et al* and *Sonerilla*

*arunachalensis* Giri *et al* which are collected after a gap of 50 years. The sporadic flowering in *Schizostachyum arunachalensis* H.B. Naithani is also noticed in the sanctuary and reported for the first time.

### PLANT RESOURCES

**Edible plants:** During the study it is revealed that about 25 plant species that are present in the sanctuary used as food or have a potential food value. The details are given in the table III. The use of wild plants as food is very common in Arunachal Pradesh, the local inhabitants knew about the use of wild plants in a traditional method. (Kar 2004; Arora & Pandey 1996, and Angami *et al* 2006).

**Table 3.** Edible plants recorded from Kane Wildlife Sanctuary.

Plant name	Family	Mode of use
<i>Amomum maximum</i> Roxburgh	Zingiberaceae	Seeds eaten raw
<i>Artocarpus heterophyllus</i> Lamarck	Moraceae	Fruits used as vegetable or sometimes eaten raw
<i>Artocarpus lakoocha</i> Wallich ex Roxburgh	Moraceae	Fruits used as vegetable or sometimes eaten raw
<i>Calamus tenuis</i> Roxburgh	Araceae	Young stems boiled and used as vegetable
<i>Canarium strictum</i> Roxburgh	Burseraceae	Fruits eaten occasionally
<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	As leafy vegetable
<i>Castanopsis indica</i> DC.	Fagaceae	Roasted seeds eaten
<i>Clerodendron colebrookianum</i> Walper	Verbenaceae	Young leaves boiled and used as vegetable
<i>Colocasia fallax</i> Schott	Araceae	Spathe boiled and fried
<i>Dillenia indica</i> L.	Dilleniaceae	Fruits as vegetable
<i>Debregeasia longifolia</i> (Burman f.) Weddel	Urticaceae	Roasted fruits eaten
<i>Dendrocalamus hamiltonii</i> Munro	Bambucaceae	Young shoots eaten as vegetable.
<i>Dioscorea pentaphylla</i> L.	Dioscoreaceae	Tuber often eaten after thorough boiling
<i>Ficus glomerata</i>	Moraceae	Fruits eaten raw or after cooking
<i>Ficus hispida</i> L.f.	Moraceae	Fruits eaten raw or after cooking
<i>Girardinia diversifolia</i> (Link) Friis	Euphorbiaceae	Young shoots as leafy vegetable
<i>Houttuynia cordata</i> Thunberg	Piperaceae	Young shoots as leafy vegetable
<i>Hydrocotyle himalaica</i> P.K. Mukerjee	Apiaceae	Young shoots as leafy vegetable
<i>Musa balbisiana</i> Colla	Musaceae	Peduncle within pseudostem eaten after cooking
<i>Mussaenda roxburghii</i> Hook.f.	Rubiaceae	Leaves as leafy vegetable
<i>Paederia scandens</i> (Loureiro) Merrill	Rubiaceae	Young shoots as leafy vegetable
<i>Phlogacanthus curviflorus</i> Nees	Acanthaceae	Leaves as leafy vegetable
<i>Polygonum chinensis</i> (L.) H. Gross	Polygonaceae	Young shoots as leafy vegetable
<i>Solanum anguivi</i> Lam.	Solanaceae	Young fruits fried and eaten raw
<i>Saurauia armata</i> Kurz	Actinidiaceae	Raw fruits eaten to control thirsty

**Timber valued plants:** 29 types of timber valued plants are present in the Kane wild life sanctuary which are given in the table IV, with their available local name, grade as classified by the forest department, cost of the timber in the local market per cubic feet

**Species of horticultural importance:** As the flora of the sanctuary includes plants of tropical, a large number of wild plants are of horticulture importance. These include species like *Begonia hatacoa* Buchanon-Hamilton ex D. Don, *Begonia palmatum* D.Don, *Colocasia fallax* Schott,

*Caryota urens* L., *Erythrina suberosa* Roxburgh, *Gonatanthus pumilus* Engler & Krause, *Globba multiflora* Wallich ex Baker, *Hedychium coccineum* Buchanon-Hamilton ex J.E.Smith, *Hedychium ellipticum* Buchanon-Hamilton ex J.E.Smith, *Hedychium stenopetalum* Lodd., *Hitchenia careyana* Benth ex Hook.f., *Hoya spp.*, *Luculia gratissima* Sweet, *Mastersia assamica* Benth, *Raphidophora glauca* Schott, *Schefflera venulosa* (Wight & Arnott) Harms., *Sauropus trinervius* Wallich ex Mueller-Arg, *Thunbergia grandiflora* Roxburgh, *Mussaenda incana* Wallich *Silvianthus bracteatus* Hook.f., *Tacca integrifolia* Ker-Gawler etc.

**Table 4:** Timber value of trees present in Kane Wildlife Sanctuary.

Plant name	Local name	Timber grade	Commonly used for	Local market price (Rs/CFT)
<i>Ailanthus integrifolia</i> Lamarck	<i>Borpata</i>	B-1	Cabinet, Planks	450.00
<i>Albizia lebbek</i> (L.) Benth	<i>Siris</i>	C	Cabinet, Planks	300.00
<i>Alstonia scholaris</i> (L.) R.Br.	<i>Satiana</i>	D	Cabinet, Planks	250.00
<i>Aglaiia hiernii</i> Viswanathan & Ramachandran	<i>Amari</i>	B-1	Beams, pole	450.00
<i>Aquilaria malaccensis</i> Lamarck	<i>Agar</i>	B-1	Beams, pole	450.00
<i>Artocarpus champa</i> Buchanon-Hamilton	<i>Sam</i>	B-1	Furniture, house construction	450.00
<i>Artocarpus heterophyllus</i> Lamarck	<i>Kathal Sopa</i>	B-2	Furniture, house construction	400.00
<i>Altingia excelsa</i> Noronha	<i>Jutuli</i>	B-2	Beams, pole	400.00
<i>Bridelia retusa</i> (Dennstedt) Alston	<i>Leluk</i>	B-1	Cabinet, Planks	450.00
<i>Canarium strictum</i> Roxburgh	<i>Dhuna</i>	B-1	House construction	450.00
<i>Careya arborea</i> Roxburgh	—	C	Miscellaneous work	300.00
<i>Castanopsis indica</i> DC.	<i>Hingori</i>	B-2	House construction	450.00
<i>Dillenia indica</i> L.	<i>Owtenga</i>	C	Beams, pole	300.00
<i>Dipterocarpus retusus</i> Blume	<i>Hollong</i>	A-4	Beams, pole	550.00
<i>Duabanga grandiflora</i> (Roxburgh ex DC.) Walpers	<i>Khokan</i>	B-1	Beams, pole	450.00
<i>Elaeocarpus floribundus</i> Blume	<i>Topo tenga</i>	F	House construction	200.00
<i>Ficus sp</i>	<i>Dimaura</i>	F	Miscellaneous work	200.00
<i>Gmelina arborea</i> Roxburgh	<i>Gambari</i>	B-1	Cabinet, Planks	450.00
<i>Kydia calycina</i> Roxburgh	<i>Pichola</i>	B-2	Cabinet, Planks	400.00
<i>Magnolia spp</i>	<i>Sopa</i>	B-1	Furniture	450.00
<i>Mesua ferrea</i> L.	<i>Nahar</i>	A-4	Furniture, house construction	550.00
<i>Phoe goalparensis</i> Hutchinson	<i>Bonsum</i>	B-1	Beams, pole	450.00
<i>Pterospermum acerifolium</i> (L.) Willdenow	<i>Hatipholia</i>	B-1	Beams, pole, planks	450.00
<i>Shorea assamica</i> Dyer	<i>Mekai</i>	A-4	Furniture, house construction	550.00
<i>Stereospermum chelonoides</i> (L.f.) DC.	<i>Paroli</i>	C	Cabinet, Planks	300.00
<i>Terminalia chebula</i> Retzius	<i>Hillika</i>	B-2	Beams, pole	400.00
<i>Terminalia myriocarpa</i> van. Heurck & Mueller-Arg.	<i>Hollock</i>	A-4	Furniture, house construction	550.00
<i>Michelia champaca</i> L.	<i>Tita sopa</i>	A-4	Furniture, house construction	550.00

**Non-timber forest products:** Non-timber forest products (NTFP) were collected by the local inhabitants within the boundary of the sanctuary. NTFPs are generally collected for the own consumption and use. They use it for different purposes such as food, house construction/ repair, preparation of domestic household materials, medicine, beverage etc. The surplus collection is sold in the local markets which fetch a good amount of money to the local people

**Bamboos:** The most common available bamboo in the Kane wild life sanctuary are *Bambusa pallida* Munro, *Bambusa tulda* Roxburgh, *Dendrocalamus hamitonii* Munro, *Dendrocalamus hookeri* Munro, *Schizostachyum polymorpha* R. Majumdar and *Schizostachyum arunachalensis* H.B. Naithani. Demand of bamboo is in high demand in the local weekly markets of the state as well in the paper and pulp industries. No commercial extraction of the bamboo is reported in the state of Arunachal Pradesh.

**Canes:** Five species of canes viz. *Calamus erectus* Roxburgh, *C. flagellum* Griffith, *C. floribundus* Griffith, *Calamus palustris* Griffith, *C. tenuis* Roxburgh, were collected from the sanctuary. All the canes are having high commercial importance. The canes are in a great demand in the furniture industry in the state as well in the other parts of our country. Besides their traditional use of furniture, basket making, canes are also used profusely in the house construction purposes.

**Thatching materials:** Three type of thatching material was found in the sanctuary, viz. *Livistona jenkinsiana* Griffith (*Toko*), *Imperata cylindrica* Raeuschel (*Thatch*), and leaves of *Calamus erectus* Roxburgh (*Jeng*). Thatching materials are of great demand, as in the rural areas of the state, house are made by wood and bamboo. Sometimes dried banana leaves are also used for thatching of small houses. The occurrence of *Toko* leaves is very limited. Apart from the natural condition, the plant is raised by local people in private lands.

### CONCLUSION

Information on plant diversity of protected area constitutes the necessary groundwork for conservation management policies. The present study shows that Kane Wild Life Sanctuary harbor a good diversity of useful plant and acts as a repository of many economic plants. Tree components in the sanctuary constitute the climax group of vegetation. The high number of herbaceous species in side the sanctuary reflects the possible influence of riparian diversity. The high diversity of useful plant species of the sanctuary play a significant role in the social security of the local people inhabited in the area. Various non timber forest products of the area give a direct monetary benefit. However the most emerging threat is the increasing demand and depleting of natural resources around the sanctuary. The production potential of different species and sustainable harvests of useful plants or plant part can boost the local economy. Such NTFP species may be promoted for large-scale plantation or multiplication in the fringe areas, which may ultimately benefit the socioeconomic conditions of the local population.

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### LITERATURE CITED

- Anonymous 1999. *The state of Forest Report 1999*. Forest Survey of India, Dehradun
- Angami, A.; Gajurel, P.R.; Rethy, P.; Singh, B. & Kalita, S.K. 2006. Status and potential of wild edible plants of Arunachal Pradesh. *Indian J. Trad. Knowl.* 5(4): 541 – 550
- Arora, R K & Pandey, A. 1996. *Wild edible Plant of India, Diversity, Conservation and Use*, National Bureau of Plant Genetic Resources, ICAR, New Delhi.
- Baisya, A.K. 2001. Flora of Arunachal Pradesh an overview. *Arunachal Forest News* 19. (1-2).
- Chauhan, A.S.; Singh, K.P. & Singh, D.K. 1996. *A contribution to the Flora of Namdhapa, Arunachal Pradesh*. Botanical Survey of India, Kolkota.
- Hartshon, G.S. 1990. An overview of neo-tropical forest dynamics. In Gentry A.H. (ed.). *Four neo-tropical rainforests*, Yale University Press, New Haven. Connecticut. USA, pp. 585 – 599.

- Kar, A. 2004. Common wild vegetables of Aka tribe of Arunachal Pradesh, *Indian J. Trad. Knowl.* 3 (3): 305 – 313.
- Panigrahi, G. & Joseph, J. 1966. A botanical tour to Tirap Frontier Division, NFA (India). *Bull. Bot. Surv. India* 8: 142 – 157.
- Panigrahi, G. & Naik, V.N. 1961. A Botanical tour to Subansiri Frontier Division (NEFA). *B u l l . Bot. Surv. India* 3 ( 3&4): 361 – 388.
- Rao, R.S. & . Joseph, J. 1965. Observation of the flora of Siang frontier division of NEFA. *Bull. Bot. Surv. India* 7: 138 – 161.
- Sinha, G.N. 2008. Forest and Forestry in Arunachal Pradesh. *SFRI Information Bulletin* 27. Forest Research Institute, Govt. of Arunachal Pradesh, Itanagar.
- Sahni, K.C. 1969. A contribution to the flora of Kameng and Subansiri district, NEFA. *Indian For.* 95 (5): 330 – 352.