UNIT –V

Legal Aspects in Ethnobotany

5.1 Concept of RET taxa

According to a report published in the scientific journal, 'Science', between 22% to 47% of the world's plant species are endangered. The IUCN Red List of threatened species or Red Data Book is a comprehensive list of the endangered or threatened species on the plant. In order to categorize threatened species, IUCN (International Union for Conservation of Nature) has updated the categories on the basis of rate of decline, geographical range, population and fragmentation. Earlier Rare, Endangered and Threatened (RET) terms were more in use. However, this classification has been replaced by the IUCN Red List of Threatened Species. The latest classification has the following nine categories.

1. Extinct (EX): No known individuals remaining.

2. Extinct in the wild (EW) : Known only to survive in captivity, or as a naturalized population outside its historic range.

3. Critically endangered (CR) : Extremely high risk of extinction in the wild.

4. Endangered (EN) : High risk of Extinction in the wild.

5. Vulnerable (VU) : High risk of Endangerment in the wild.

6. Near Threatened (NT) : Likely to become endangered in the near future.

7.Least Concern (LC) : Lowest risk. Widespread and abundant taxa are included in this category.

8. Data Deficient (DD): Not enough data to make an assessment of its risk of extinction.

9. Not Evaluated (NE): Has not evaluated against the criteria.

The threatened species categories now used in the Red data Books and Red List are **Critically Endangered** (facing an extremely high risk of extinction in the wild in the immediate future), **Endangered** (not critical , but facing a very high risk

of extinaction in the wild in the near future), **Vulnerable** (not critical or endangered but facing a high risk of extincation in the wild in the mid term future). Together these categories are described as 'Threatned'.

The latest Red list was released on 19th July, 2012 at Rio+20 Earth Summit has a list of nearly 2000 species of plants and animals.

Red listed Plants of India:

S.No.	Name of the plant	Family	Distribution	Status
1	*Barleria gibsonioides*	Acanthaceae	Maharashtra	R
2	*Acer caesium*	Aceraceae	Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh	V
3	*Adiantum soboliferum*	Adiantaceae	Assam, Nagaland	Possibly Extinct
4	*Allium stracheyi*	Alliaceae	Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh	V
5	*Achyranthes coynei*	Amaranthaceae	Maharashtra	R
6	*Crinum eleonorae*	Amaryllidaceae	Maharashtra	R
7	*Buchanania beriberi*	Anacardiaceae	Kerala	E
8	*Mangifera andamanica*	Anacardiaceae	South Andaman	V
9	*Polyalthia rufescens*	Annonaceae	Tamil Nadu, Kerala	R
10	*Pimpinella katrajensis*	Apiaceae	Maharashtra	R
11	*Polyzygus tuberosus*	Apiaceae	Maharashtra, Karnataka	R

12	*Pternopetalum senii*	Apiaceae	Arunachal Pradesh	R
13	*Amorphophallus oncophyllus*	Araceae	South Andaman Island	R
14	*Typhonium incurvatum*	Araceae	Maharashtra	R
15	*Typhonium incurvatum*	Araceae	Maharashtra	R
16	*Calamus dilaceratus*	Arecaceae	Andaman Islands	R
17	*Phoenix rupicola*	Arecaceae	Sikkim, West Bengal, Arunachal Pradesh, Meghalaya	R
18	*Wallichia triandra*	Arecaceae	Arunachal Pradesh	R
19	*Ceropegia angustifolia*	Asclepiadaceae	Meghalaya	V
20	*Anaphalis barnesii*	Asteraceae	Kerala	E
21	*Helichrysum cutchicum*	Asteraceae	Gujarat	R
22	*Lactuca filicina* Duthie	Asteraceae	Uttar Pradesh (Kumaon)	E
23	*Diplazium travancoricum*	Athyriaceae	S. India	R
24	*Impatiens macrocarpa*	Balsaminaceae	Kerala	E or Possibly Extinct
25	*Begonia aborensis*	Begoniaceae	Arunachal Pradesh	R
26	*Begonia rubella*	Begoniaceae	Sikkim	R
27	*Berberis affinis*	Berberidaceae	Uttar Pradesh (Kumaon)	R

28	*Erysimum thomsonii*	Brassicaceae	Himachal Pradesh	R
29	*Campanula alphonsii*	Campanulaceae	Nilgiri and Pulney Hills, Western Ghats	R
30	*Polycarpaea diffusa*	Caryophyllaceae	Tamil Nadu	V
31	*Silene kumaonensis*	Caryophyllaceae	Uttar Pradesh (Garhwal)	R
32	*Ipomoea clarkei*	Convolvulaceae	Maharashtra	R
33	*Sphaeropteris albosetacea* [*Cyathea albosetacea*]	Cyatheaceae	Nicobar Islands	V
34	*Cycas beddomei*	Cycadaceae	Andhra Pradesh	V
35	*Cyperus dwarkensis*	Cyperaceae	Gujarat	R
36	*Dioscorea deltoidea*	Dioscoreaceae	Kashmir to Assam	V
37	*Elaeocarpus gaussenii*	Elaeocarpaceae	Western Ghats	R
38	*Elaphoglossum stigmatolepis*	Elaphoglossaceae	Nilgiri hills	V
39	*Bridelia kurzii*	Euphorbiaceae	Andaman & Nicobar Islands	V
40	*Euphorbia panchganiensis*	Euphorbiaceae	Maharashtra	R
41	*Phyllanthus narayanaswamii*	Euphorbiaceae	Andhra Pradesh	E
42	*Acacia campbellii*	Fabaceae	Andhra Pradesh	R
43	*Albizia thompsonii*	Fabaceae	Andhra Pradesh, Tamil Nadu, Orissa	R

44	*Crotalaria clavata*	Fabaceae	Tamil Nadu	E
45	*Crotalaria digitata*	Fabaceae	Tamil Nadu	R
46	*Didymocarpus missionis*	Gesneriaceae	Tamil Nadu	R
47	*Gomphandra comosa*	Icacinaceae	Andaman & Nicobar Islands	R
48	*Juncus sikkimensis*	Juncaceae	Sikkim	R
49	*Pogostemon atropurpureus*	Lamiaceae	Tamil Nadu, Kerala	R
50	*Chlorophytum borivilianum*	Liliaceae	Gujarat, Maharashtra	R
51	*Lilium macklineae*	Liliaceae	Manipur	E
52	*Ammania desertorum*	Lythraceae	Gujarat, Rajasthan	R
53	*Lagerstroemia minuticarpa*	Lythraceae	Assam, Sikkim	R
54	*Michelia punduana*	Magnoliaceae	Meghalaya, Nagaland	R
55	*Aspidopteris canarensis*	Malpighiaceae	Karnataka, Kerala, Maharashtra.	R
56	*Abutilon ranadei*	Malvaceae	Maharashtra	E or Presumed Extinct
57	*Decaschistia rufa*	Malvaceae	Peninsular India	E
58	*Aglaia talbotii*	Meliaceae	Karnataka, Goa	V
59	*Ficus andamanica*	Moraceae	South Andaman Island	R
60	*Antistrophe serratifolia*	Myrsinaceae	Tamil Nadu, Kerala	R

61	*Eugenia discifera*	Myrtaceae	Tamil Nadu, Kerala	E
62	*Syzygium manii*	Myrtaceae	Middle Andaman Island	R
63	*Anoectochilus nicobaricus*	Orchidaceae	Great Nicobar Island	E
64	*Anoectochilus rotundifolius*	Orchidaceae	Tamil Nadu	E or Possibly Extinct
65	*Bulbophyllum elegantulum*	Orchidaceae	Karnataka	V
66	*Diplomeris hirsuta*	Orchidaceae	Uttar Pradesh (Kumaon), West Bengal	V
67	*Bhidea burnsiana*	Poaceae	Maharashtra, Karnataka	R
68	*Coelachne minuta*	Poaceae	Maharashtra	R
69	*Deyeuxia simlensis*	Poaceae	Himachal Pradesh	Presumed Extinct
70	*Dicanthium armatum*	Poaceae	Maharashtra	R
71	*Indotristicha tirunelveliana*	Podostemonaceae	Tamil Nadu	R or V
72	*Willisia selaginoides*	Podostemonaceae	Kerala	R
73	*Dendroglossa minutula*	Polypodiaceae	Meghalaya	E
74	*Aconitum deinorrhizum*	Ranunculaceae	Jammu & Kashmir, Himachal Pradesh	V
75	*Cotoneaster buxifolius*	Rosaceae	Tamil Nadu	V
76	*Hedyotis scabra*	Rubiaceae	West Bengal, Assam,	R

			Arunachal Pradesh	
77	*Rubia himalayensis*	Rubiaceae	Jammu & Kashmir	V
78	*Isonandra stocksii*	Sapotaceae	Western Peninsular India	V
79	*Campylanthus ramosissimus*	Scrophulariaceae	Gujarat	R
80	*Picrorhiza kurrooa*	Scrophulariaceae	Jammu & Kashmir to Sikkim	V
81	*Selaginella cataractrum*	Selaginellaceae	South India	E
82	*Smilax wightii*	Smilacaceae	Tamil Nadu	R
83	*Pauia belladonna*	Solanaceae	Arunachal Pradesh	R
84	*Eriolaena lushingtonii*	Sterculiaceae	Andhra Pradesh, Tamil Nadu	V
85	*Pterospermum reticulatum*	Sterculiaceae	Karnataka, Kerala, Tamil Nadu	R
86	*Cleyera japonica* Thunb. var. *grandiflora*	Theaceae	Meghalaya	R
87	*Coryphoteris didymochlaenoides*	Thelypteridaceae	Meghalaya	R
88	*Oreopteris elwesii*	Thelypteridaceae	Sikkim	R
89	*Ampelocissus helferi*	Vitaceae	Andaman Islands	V
90	*Cayratia pedata*	Vitaceae	Nilgiri	R
91	*Cayratia roxburghii*	Vitaceae	Kerala, Tamil Nadu	V

92	*Cissus spectabilis*	Vitaceae	Sikkim, West Bengal	E
93	*Amomum microstephanum*	Zingiberaceae	Tamil Nadu, Kerala	R
94	*Paracautieya bhatii*	Zingiberaceae	Karnataka	V

Red listed plants of J&K

Sl. No.	**Name of the species**	**Family**	**Status**
1.	*Pinus gerardiana*	Pinaceae	R
2.	*Acer caesium*	Aceraceae	V
3.	*Chaerophyllum cachemiricum*	Apiaceae	E
4.	*Ferula thomsonii*	Apiaceae	E
5.	*Heracleum jacquemontii*	Apiaceae	E
6.	*Heracleum thomsonii*	Apiaceae	R
7.	*Ligusticum marginatum*	Apiaceae	R
8.	*Peucedanum thomsoni*	Apiaceae	E
9.	*Artemisia dolichocephala*	Asteraceae	I
10.	*Chondrilla setulosa*	Asteraceae	R
11.	*Cousinia falconeri*	Asteraceae	I
12.	*Cremanthodium arnicoides*	Asteraceae	E
13	*Cremanthodium plantagineum* Max. forma *ellissii*	Asteraceae	R
14.	*Inula racemosa*	Asteraceae	V
15.	*Lactuca benthamii*	Asteraceae	E
16.	*Lactuca undulata*	Asteraceae	E
17.	*Saussurea atkinsoni*	Asteraceae	I
18.	*Saussurea bracteata*	Asteraceae	R
19.	*Saussurea clarkei*	Asteraceae	R
20.	*Saussurea costus*	Asteraceae	E
21.	*Saussurea roylei*	Asteraceae	I
22.	*Balanophora involucrata*	Balanophoraceae	E
23.	*Impatiens pahalgamensis*	Balsaminaceae	I
24.	*Berberis huegeliana*	Berberidaceae	I

25.	*Berberis kashmiriana*	Berberidaceae	R
26.	*Berberis orthobotrys*	Berberidaceae	I
27.	*Berberis pseudoumbellata*	Berberidaceae	I
28.	*Berberis royleana*	Berberidaceae	I
29.	*Podophyllum hexandrum*	Berberidaceae	R

5.2: Role of IUCN and BSI in plant conservation

IUCN stands for International Union for Conservation of Nature and Natural Resources. It is an international organization working in the field of nature conservation and sustainable use of natural resources. IUCN was founded on 5th Oct, 1948. Its headquarters are in Gland Switzerland.

Organization of IUCN: IUCN has three components

1. Member Organizations: In 2017 IUCN had 1400 members

2. Six Scientific Commissions

3. The Secretariat

The IUCN members include 1400 governmental and non governmental organizations from more than 140 countries. It is governed by a democratically elected council, which is chosen by member organizations at each World Conservation Congress. The IUCN's funding comes from a number of governments, agencies, foundations, member organizations and corporations.The volunteer work of more than 10,000 scientists and other experts is coordinated through special commissions on education and communications; environmental; economic and social policy; environmental law; ecosystem management on species survival and protected areas. All of the IUCN work is guided by a global program, which is adopted by member organizations every 4 years at IUCN World Conservation Congress.

Role of IUCN in Conservation

- Through its member organizations, IUCN supports and participates in environmental scientific research, promotes and helps in implementation of

national conservation policies and operates thousands of field projects worldwide.

- The IUCN's activities are organized into several theme based program ranging from business and biodiversity to forest preservation to water and wetland conservation (Ramsar Convention).
- In addition, a small amount of special initiative draw upon the work of different programs to address specific issues such as climate change, conservation and poverty reduce.
- The IUCN maintains the IUCN Red list of threatened species , a comprehensive assessment of the current risk of extinction of thousands of plant and animal species.IUCN Red list of Threatened species founded was in 1964 and is the World's most comprehensive list of global conservation status of plants and animals.

  The IUCN is best known for its IUCN's Red List of Threatened Species

Botanical Survey of India:

The Botanical Survey of India (BSI), a premiere research organisation under Ministry of Environment & Forests (MoEF), Govt. Of India, has been engaged in exploring, identifying and documenting rich plant resources of the country. The basic objective of BSI is to explore the plant resources of the country through and to identify the plant species of economic virtues. The present Director of Botanical Survey of India is Dr. Ashiho Asosii Mao.

Brief Histroy of BSI:

BSI was founded by East India Company on 13th February, 1890. Sir George King, who was the then superintendent of Royal Botanical Garden, Calcutta (now Acharya Jagadish Chandra Bose Indian Botanic Garden),also became the first Director of BSI. The Calcutta Garden became the headquarter of the BSI.Many renowned naturalists and botanists from Botanical Survey made valuable contributions to the knowledge of country's flora since its inception e.g. Flora of Indian Subcontinent by Sir J.D.Hooker between 1872 to 1897. After the retirement of Mr. C.C. Calder, the last director of Botanical Survey in 1939, it remained

dormant till 1953. Dr. E.K.Janaki Ammal appointed as Officer on Special Duty on 14th October, 1952 to prepare a reorganisation plan of the Botanical Survey of India for much needed inventory of the country's rich floral resources. There organisation plan was approved by Govt. Of India on 29th March 1954 with the following objectives.

1.To undertake intensive floristic surveys and collect accurate and detailed information on the occurrence, distribution, ecology and economic utility of plants in the country.

2.To collect, identify and distribute the materials which may be of use to the educational and research institutions and

3.To act as custodian of authentic collections as well planned herbaria and to document the plant resources in the form of Local, District, state and national Floras.

During successive plan periods, the functional role of the Survey was further expanded to include various new areas such as inventorying of endemic, rare and threatened plant species; evolving conservation strategies; studies on fragile ecosystems and protected areas like sanctuaries, National Parks and Biosphere Reserves; conservation, multiplication and maintenance of germplasm of endemic and threatened species, wild ornamentals and other plant genetic resources in botanic gardens and orchidaria; ethno-botanical studies and development of national database on herbarium specimens and live collections.

The Present Set Up:

The botanical Survey of India has its Headquarters at Kolkata with Flora Cell, Cryptogamic Section, Palynology Section, Central Library,Publication Section, Technical Section,Pharmacognosy Section, Ecology and PlantChemistry Section.
The **Central library** has the collection of 54,500 accessioned books and also subscription to more than 62 National and International journals. Also , the headquarter has **AJC Bose Indian Botanic Garden, Howrah** established in
1790 by Robert Kyd on the bank of River Hooghly, and formerly known as Indian Botanical Garden, is one of the best landscaped gardens in the world. At present, the garden has an area of 273 acres and is a living repository of more than 14,000 plants belonging to 1,405 species. The garden has many tourist attractions such as the'Great Banyan Tree, a living wonder in the plant kingdom. **The Central National**

Herbarium: The Central National Herbarium (CAL) is one of the oldest and largest herbaria in the world. Presently, the Central National Herbarium possesses about 2.6 million herbarium specimens belongingto nearly 350 families of angiosperms. **Central Botanical Laboratory** established on 13 April 1954, is a Centre of research in the field of Ethnobotany and Economic Botany.

Also the BSI has 11 regional centres in various bio-geographical regions of the country

1. The Eastern Regional Centre, Shillong: Concerns with the flora of Northeast India, comprising the states of Assam, Manipur, Meghalaya Mizoram Nagaland and Tripura.

2. Western Regional Centre, Pune: The jurisdiction of this regional Centre includes states of Maharashtra, Goa, Karnataka and the Union Territories of Dadra, Nagar Haveli, and Daman Diu.

3. Southern Regional Centre, Coimbatore: The Centre covers Kerala, Tamil Nadu and the Union Territories of Lakshadweep and Puducherry

4. Northern Regional Centre, Dehradun: The Centre covers Chandigarh, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab and Uttarakhand, including Trans-Himalayan Cold Deserts of Western Himalaya.

5. Central Regional Centre, Allahabad: The Centre covers Chhattisgarh, Madhya Pradesh and Uttar Pradesh.

6. Arid Zone Regional Centre, Jodhpur: The centre covers the plant diversity of Rajasthan and Gujarat

7. Andaman and Nicobar Regional Centre Port Blair: The centre documents the plant diversity of the Andaman and Nicobar Islands

8. Arunachal Pradesh Regional Centre, ltanagar: The Centre is exclusively devoted to the plant-rich biodiversity of Arunachal Pradesh.

9. Sikkim Himalayan Regional Centre, Gangtok: The Centre is exclusively devoted to the state of Sikkim.

10. Botanical Garden of Indian Republic, Noida covers National Capital Region**.**

11. Deccan Regional Centre, Hyderabad: Established in 2005 at Hyderabad, the Centre covers Andhra Pradesh and Odisha.

Role of BSI in conservation:

The aim and objectives of the department were reviewed in the year 1987 and prioritized under primary and secondary objectives. The objectives were further streamlined in view of the recommendations made by successive Programme/Research advisory committees as well as the 'National Seminaron the Role of BSI and ZSI in the Next Millennium', organised by MoEF in 1999. The current objectives of the Survey are as under:

Primary Objectives:

1.Exploration, inventorying and documentation of phytodiversity in general and protected areas, hotspots and fragile ecosystems in particular; publication of National, State and District Floras.
2.Identification of threatened or red list species and species rich areas needing conservation; ex-situ conservation of critically threatened specimens in botanical gardens.
3.Survey and documentation of traditional knowledge (Ethno-botany) associated with plants.
4.Develop a National database of Indian Plants, including herbarium and live specimens, botanical paintings or illustrations etc.

Secondary Objectives:

1. Revisionary or monographic studies on selected plant groups.
2. Qualitative analysis of nutritive value of ethno-food plants and other economically useful species.
3. Capacity building in plant taxonomy through refresher courses nd post M.Sc. certificate course.
4. Environment Impact Assessment of areas assigned by the ministry.
5. Develop and maintain Botanical Gardens, Museums and Herbaria.
6. Preparation of Seed, Pollen and Spore Atlas of Indian plants.

5.3 (A)Biopiracy

The practice of commercially exploiting naturally occurring biochemical or genetic material especially by obtaining patents that restrict its future use, while failing to pay fair compensation to the community from which it originates.

Biopiracy is a situation in which indigenous knowledge of nature, originating with indigenous peoples, is used by others for profit, without permission from and with little or no compensation or recognition to the indigenous people themselves. An example come from cases in which bioprospectors draw on indigenous knowledge of medicinal plants, which is later patented by medical companies without recognizing the fact that the knowledge is not new, or invented by the patenter, and depriving the indigenous community to the rights to commercial exploitation of the technology that they themselves had developed. These practices contribute to inequality between developing countries rich in biodiversity, and developed countries hosting companies that engage in 'biopiracy'.

Bioprospecting or Biopiracy

Biodiversity prospecting is the exploration, extraction and screening of biological diversity and indigenous knowledge for commercially valuable genetic and biochemical resources. The market for buying and selling exotic biological species is expanding rapidly.

For decades, plant collectors from industrialized countries have searched for valuable genetic material for agricultural plant breeding. This is increasingly fueled by the fact that species, their genetic material, and the ecosystems of which they are a part are rapidly disappearing. A growing number of pharmaceutical corporations, biotechnology companies (and their intermediaries) are searching the forests, fields and waters of the developing world in search of biological riches and indigenous knowledge. Mostly northern-based institutions seek access to tropical biodiversity for the primary purpose of developing patented and profitable products.

Quite often valuable chemical compounds derived from plants, animals and microorganisms are more easily identified and of greatest commercial value when collected with indigenous knowledge and/or found in territories traditionally inhabited by indigenous peoples. About one in 10,000 chemicals derived from mass screening of plants, animals and microbes eventually results in a potentially profitable drug. Through observing and talking to indigenous healers this amount can be significantly reduced. But often no money changes hands in the process. Nor

is recognition given to the indigenous farming communities who selected, maintained and improved traditional crop varieties.

Instead, patents are granted to corporations who claim inventions based on indigenous resources or knowledge. More specifically biopiracy, refers to the appropriation, generally by means of patents or legal rights over biological materials by international companies to develop food or medicines, without recompensing the countries from which they are taken.
This is why bioprospecting is often perceived as biopiracy.

International agreements
Bioprospecting is touched on by the Convention on Biological Diversity which entered into force in December, 1993.

It recognizes that states have sovereign rights over their natural resources, and that terms and conditions for access to these materials are within the domain of national legislation. The Convention also recognizes the "knowledge, innovations and practices of indigenous and local communities" and specifically "encourage[s] the equitable sharing of benefits arising from the utilization of such knowledge, innovations and practices" (Article 8(j)).

The Convention offers a multilateral facade for addressing conservation and sustainable use of biodiversity, but no multilateral mechanisms for making it happen. The Convention promotes bilateral deals (commercial contracts and other agreements for access to biodiversity) but not a strong plan of action based on broad, multi-country collaboration (especially South-South) for access to–and development of–biological diversity.

Examples of Biopiracy

1. **Patenting of *Azadirachta indica:*** The people of India in a variety of ways have used neem , since time immemorial. Indians have shared the knowledge of the properties of the neem with the entire World. Pirating this knowledge, the USDA and an American MNC W. R. Grace in the early 90s sough a patent (No. 0426257 B) from the European Patent Officer (EPO) on the "Method for controlling on plants by the aid of hydrophobic extracted neem oil". The patenting of the fungicidial properties of neem was an example of biopiracy.
2. **Patenting of Basmati:** Basmati is a long grained, aromatic variety of rice indigenous to the Indian subcontinent. In 1997 the US patent and

Trademark office (USPTO) granted a patent (No. 5663484) to a Texas based American company Rice Tec Inc for Basmati rice line and grains". The patent application was based on 20 very broad claims on having "invented" the said rice. Due to the people's movement against Rice Tec in March 2001 the USPTO has rejected all but three of the claims.

3. **Rice Biopiracy:** Syngenta is a biotech company that tried to grab the precious collection of 22,972 varieties of paddy, India's rice diversity form India's rice bowl, Chattisgarh in India. Syngenta has signed a MOU with the Indira Gandhi Agricultural University (IGAU) for access to Dr. Richharia's priceless collection of rice diversity. Dr. Richharia is ex-director of Central Rice Research Institute (CRRI), Cuttak and is known as the rice sage of India who has done pioneering work in this field.

5.3 (B): Traditional knowledge

Traditional knowledge(TK) is integral part of the identity of most local communities. Attempts to exploit TK for commercial benefit can lead to its misappropriation and can prejudice the interests of its rightful custodians. In the face of such risks, there is a need to develop ways and means to protect and nurture TK for sustainable development that are in line with the interests of TK holders. The preservation, protection and promotion of the TK-based innovations and practices of local communities are particularly important for developing countries. Their rich endowment of TK and biodiversity plays a critical role in their health care, food security, culture, religion, identity, environment, trade and development. Yet, this valuable asset is under threat in many parts of the world. There are concerns that this knowledge is being used and patented by third parties without the prior informed consent of TK holders and that few, if any, of the derived benefits are shared with the communities in which this knowledge originated and exists. Such concerns have pushed TK to the forefront of the international agenda, triggering lively debate about ways to preserve, protect, further develop and sustainably use TK.

Protection of Traditional Knowledge

Traditional knowledge in present Intellectual Property Rights (IPR) regime can be protected through two ways:

(I)Positive Protection (II)Defensive Protection

(I)**Positive Protection**: In this type of protection , TK holder can acquire an IPR or any other alternative rights provided under sui-generis system. They can take action against misuse of TK. This form of protection focuses on the empowerment of traditional knowledge holders and caters to actual needs of TK holders.This form of protection promotes Prior Informed Concent; equiable benefit sharing from the use of traditional knowledge and repress misappropriation of traditional knowledge.

(a) **Prior informed Concent (PIC)**: PIC is the permission taken from original holders of biological resources and related traditional knowledge to access and commercialise exploitation of resource and associated knowledge. Any company or individual who want to use biological resources for commercial purpose has to obtain the Prior informed Concent of all the communities and all members of each community who have used and contributed collectively to the innovation of biodiversity related knowledge prior to physically accessing the resource. PIC would lead to equitable benefit sharing and prevent the misuse of TK.

(b) **Benefit Sharing:** Benefit sharing refers to the agreement of sharing benefits (both monetary and non monetary) resulting from commercially exploiting the biological resources and associated knowledge of a traditional community with that community. These monetary and non monetary benefits include setting of a trust fund for a particular group of beneficiaries, technology transfer, providing employment opportunities, developing local infrastructure, capacity building and scientific collaborartion. Equiable benefit sharing agreements are promising in giving full recognition and protection to the rights of indigenous and local communities to their knowledge and genetic resources.

(II)**Defensive Protection:** This kind of system provides safeguards against illegitimate intellectual property rights acquired by third parties over traditional knowledge. These safeguards are:

(a) Requirement of disclosure of origin of genetic resources and associated TK relevant to the invention in the patent application.

(b)Preparing a database containing complete information about traditional knowledge in a scientific and technical form and accessible to patent examiners. Such a database will be helpful in determining novelty of the patent in question.

(c) Protection of traditional Knowledge through Documentation and Database. Many patents have been granted on biological resources and related traditional knowledge. The reson behind this is lackof documentation of TK, as in India Traditional Knowledge has been orally passed for generations from person to person. To prove a patent is not an easy task. There is requirement of a technical record a prior art. To safeguard Tk from unscrupulous elements, proper documentation of TK is required. Such documented material would serve as a databse for researching for information before grant of patent.

5.3 (C): Intellectual Property Rights

These are constitutional rights granted by the Govternment of a country to creators or owners of the intellectual property to exclude others from exploring the same commercially for a given period of time. Therefore, it is essential to preserve this knowledge so as to give equity considerations to holders of TK and to avoid misuse of biological resources and related knowledge by unauthorized parties. Individuals related to areas such as literature, music invention etc. can be granted such rights which can then be used in business practices by them.

The creator/inventor gets exclusive rights against any mususe or use of work without his/her prior information. However, the rights are granted for a limited period of time to maintain equilibrium. Biopirates use **Intellectual Property Rights (IPR)** as tool to steal traditional knowledge and exploit biological resources and this happens because of some limitations in IPR system. Therefore, it is requested to introduce some sui-genesis elements in the existing IPR system.

The Paris Convention for the protection of Industrial property in 883 and the 'Berna Convention for the Protection of Literary and Artistic works' in 886 were the first conventions which have recognized the importance of safeguarding intellectual property. Both the treaties are under the direct administration of the WIPO. Every nation has framed its own intellectual property laws. But on international level it is governed by the World Intellectual Propery Organisation (WIPO) .The following list of activities which are covered by the intellectual property rights are laid down by the the World Intellectual Propery Organisation (WIPO):

(I) Industrial designs
(II) Scientific discoveries
(III) Protection againt unfair competition

(IV) Literary, artistic and scientific works
(V) Inventions in all fields of human endeavour
(VI) Performances of performing artists , phonograms and broadcasts
(VII) Trademarks, service marks, commercial names and designations
(VIII) All other rights resulting from Intellectual activity in the industrial, scientific, literary or artistic fields.

Advantages:

Intellectual property rights are advantages in the following ways:

(i) It provided exclusive rights to creators or inventors
(ii) It encourages individuals to distribute and state information and data instead of keeping it confidential
(iii) It provides legal defence and offers to the creators to incentive of their work.
(iv) In helps in social and financial development.

5.4: Biodiversity laws in India

Biological Diversity Act, 2002

Biological Diversity Act, 2002 (No. 18 of 2003; notified on 5th February, 2003; effective from 15th April 2004), is an act of Parliament of India, enacted for the preservation of biological diversity of India. It was enacted to fulfil the obligations of Convention on Biological Diversity (CBD) as India is one of the signatories to this convention. Salient features of the Biological Diversity act 2002 are as:

- To regulate access to the biological resources of the country.
- To conserve and sustainable use of biological diversity.
- To respect and protect knowledge of local communities related to biodiversity.
- To secure sharing of benefits with local people as conservers of biological resources
- Conservation and development of areas of importance from standpoint of biological diversity by declaring them as biological diversity heritage sites.
- Protection and rehabilitation of threatened species.

- Involvement of institutions of state governments in the broad scheme of the implementation of the Biological Diversity Act through constitution of committees.

Three Goals of Biological Diversity Act are:
1. To promote the conservation of biodiversity,
2. The sustainable use of its components and
3. The fair and equitable sharing of benefits arising out of the utilisation of genetic resources.
This act contains a detailed mechanism for equitable sharing of benefits arising out of the use of traditional knowledge and genetic resources

The Structure of Biodiversity Act 2002 :

1. National Biodiversity Authority (NBA)
2. State Biodiversity Boards(SBB)
3. Biodiversity Management Committees (BMCs)

The entire act is divided into XII Chapter containing 65 Articles. These are discussed as:
Chapter I deals with title and definitions. It contains Article 1 & 2.

Chapter II deals with regulation of access to biological diversity. It contains articles 3-7.

- **Article 3:** Certain person not to undertake Biodiversity related activities without approval of National Biodiversity Authority (NBA).
- **Article 4:** Results of research not to be transferred to certain persons without approval of National Biodiversity Authority (NBA).
- **Article 5:** Sec. 3 & Sec. 4 not to apply to certain collaborative research projects**.**
- **Article 6:** Application for intellectual property rights not to be made without approval of National Biodiversity Authority (NBA).

Article 7: Prior Intimation to state Biodiversity Board for obtaining biological resource for certain purposes**.**

Chapter III is concerned with National Biodiversity Authority (NBA). It contains Article 8-17.

- **Article 8**: Establishment of national Biodiversity Authority (NBA)

- **Article 9:** Conditions of service of Chairperson and members.
- **Article 10**: Chairperson to be Chief Executive of National Biodiversity Authority (NBA).
- **Article 11**: Removal of members
- **Article 12**: Meetings of National Biodiversity Authority
- **Article 13**: Committees of National Biodiversity Authority
- **Article 14**: Officers and employees of National Biodiversity Authority
- **Article 15**: Authentication of orders and decisions of National Biodiversity Authority
- **Article 16**: Delegation of powers.
- **Article 17**: Expenses of National Biodiversity Authority to be defrayed out of the consolidated Fund of India.

Chapter IV deals with the powers and functions of national Biodiversity Authority (NBA)

- **Article 18:** It contains guidelines regarding functions and powers of National Biodiversity Authority.

Chapter V is concerned with approval by National Biodiversity Authority (NBA). It contains Article 19-21.

- **Article 19:** Approval byNational Biodiversity Authority for undertaking certain activities.
- **Article 20:** Transfer of biological resource or knowledge
- **Article 21:** Determination of equitable benefit sharing by National Biodiversity Authority
- **Chapter VI** is concerned with State Biodiversity Boards (SBB). It contains Article 22-25.
- **Article 22:** Establishment of State Biodiversity Board
- **Article 23:** Functions of State Biodiversity Board
- **Article 24:** Power of State Biodiversity Board to restrict certain activities violating the objectives of conservation etc.
- **Article 25:** Provisions of Articles 9 to 17 to apply with modifications to State Biodiversity Board

Chapter VII deals with Finance, Accounts and Audit of National Biodiversity Authority (NBA). It contains Article 26-30.

- **Article 26:** Grants or loans by the Central Government

- **Article 27:** Constitution of National Biodiversity Fund
- **Article 28:** Annual Report of National Biodiversity Authority
- **Article 29** Budget, accounts and audit
- **Article 30:** Annual report to be laid before Parliament

Chapter VIII deals with Finance, Accounts and Audit of State Biodiversity Board (SBB). It contains Article 31-35.

- **Article 31:** Grants of money by State Government to State Biodiversity Board
- **Article 32:** Constitution of State Biodiversity Fund
- **Article 33**: Annual Report of State Biodiversity Board
- **Article 34:** Budget, accounts and audit of State Biodiversity Board
- **Article 35:** Annual report of State Biodiversity Board of to be laid before State Legislature.

Chapter IX is concerned with the duties of the Central and State Governments**.** It contains Article 36-40.

- **Article 36:** Central Government to develop National Strategies plans etc. for conservation of biological diversity.
- **Article 37:** Biodiversity heritage sites.
- **Article 38:** Power of Central Government to notify threatened species.
- **Article 39:** Power of Central Government to designate repositories.
- **Article 40:** Power of Central Government to exempt certain biological resources.

Chapter X deals with Biodiversity Management Committees (BMCs)

- **Article 41:** deals with the constitution **of** Biodiversity Management Committees

Chapter XI deals with the Local Biodiversity Fund. It contains Article 42-47.

- **Article 42:** Grants to Local Biodiversity Fund
- **Article 43:** Constitution ofLocal Biodiversity Fund
- **Article 44:** Application of Local Biodiversity Fund
- **Article 45:** Annual Report of Biodiversity Management Committees
- **Article 46:** Audit of the accounts **of** Biodiversity Management Committees
- **Article 47:** Annual Report of theBiodiversity Management Committees to be submitted to District Magistrate.

Chapter XII contains miscellaneous provisions. It contains Article 48-65

- **Article 48:** National Biodiversity authority to be bound by the directions given by Central Government.
- **Article 49:** Power of State Government to give directions
- **Article 50:** Settlement of disputes between State Biodiversity Boards
- **Article 51:** Members, officers etc. of National Biodiversity Authority State Biodiversity Board deemed to be public servants.
- **Article 52:** Appeal
- **Article 53:** Appeal to National Green Tribunal
- **Article 54:** Execution of determination or order
- **Article 55:** Penalties
- **Article 56:** Penalty for contravention of directions or orders of Central Government, State Government, National Biodiversity Authority and State biodiversity Boards.
- **Article 57:** Offences by Companies
- **Article 58:** Offences to be cognizable or non-bailable
- **Article 59:** Act to have effect in addition to other acts.
- **Article 60:** Power of Central Government to give directions to State Government.
- **Article 61:** Cognizance of offences
- **Article 62:** Power of Central Government to make rule**s**
- **Article 63:** Power of State Government to make rules
- **Article 64:** Power to make regulations
- **Article 65:** Power to remove difficulties