Chapter 1

Introduction

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Chapter 1

Introduction

The quest for growth and improvement of life makes human beings different from animals. It is the endeavour of human kind to strive for the betterment of life. Man is constantly trying his best to find newer ways and means to fulfill his desires. Nature on the other hand also provides the best of life to its most precious creation i.e. human beings.

Man has found ways to improve his life by innovations and by encouraging innovators through the grant of monopoly in terms of Intellectual Property Rights. Mother Nature also ensures the improvement of human life by providing a rich and varied biodiversity. Though the aim of man and nature is common i.e. improvement of human life, their means are increasingly conflicting with each other.

In his unquenchable thirst for a better life man started expanding the scope of Intellectual Property Rights in all directions, including biodiversity which is not his own creation but a gift from nature. The expansion of "Intellectual Property Rights" into the domain of biodiversity and life forms, and the globalization of this regime, has been an attempt to enclose the biological and intellectual commons.

The original idea of an invention in the mechanical domain was to grant protection to an inventor who had created an indigenous new device. This protection allowed an exclusion of others from 'making' similar artifacts for a limited period of time, usually twenty years.

However, today the scope of granting Intellectual Property Rights is not confined to mere technological inventions or inanimate objects but has expanded to plants, biological material and living organisms, thus making what was once God's creation into an individual's commercial venture. It all started when the US Supreme Court upheld a patent granted on microorganisms. The patents granted to Ananda Chakravarthy for genetically engineered pseudomonas bacteria[1], and to Agracetus on modified soyabean plant[2], have opened a Pandora's Box. The cloning of Dolly, a sheep, by Dr. Ian Wilmut of the Roslin Institute of Scotland, was a step forward in creating life. This has culminated in a perverse climax in the reporting of the cloning of even a human!!! This has brought everything on the earth within easy reach of the patents sharks. It is difficult to imagine where this hunger for supremacy over all other living things and even Nature will lead humankind.

The granting of patents covering all genetically engineered varieties of a species, without bothering about which genes have been transferred or how they were transferred, enables a single inventor to control what we grow on our farms and in our

[1] *US Patent no 4259444 dt March 31, 1981*
[2] *Patent no EP 301749*

gardens. So the seeds sown by a farmer are no longer the creation of Nature but have become the commodity of a multinational. The research of scientists and millions of farmers over centuries has potentially been negated in a single, legal act of economic hijack, by the stroke of a pen.

We all need to think about nature, not allow it to be a concern of environmentalists and naturalists, because it has been rightly said that –

"The wild places are where we began.
When they end, so do we."

- David Brower

1.1 Area of the study

Intellectual Property Rights (IPRs) are the rights to make, use, and sell a new product or technology, which are granted, usually for a period of 20 years, either to the inventor himself or to any organization which files a claim on behalf of the inventor. They are generally granted in the form of patents, trademarks, or copyrights and are traditionally covered under the law of the respective nation.

Every country, whether it is developed, developing or under-developed, has its own IPR laws, to strike a balance between its industry's desire to capitalize on its investments in technological development and the rights of its society to benefit from the knowledge and resources of its country.

IPRs, as the term suggests, are meant to be rights to intellectual property, such as ideas and information, which are used in new inventions or processes. These rights on intellectual property enable the holder to exclude imitators from marketing such inventions or processes for a specified time; in exchange, the holder is required to disclose the formula or idea behind the product/process.

The effect of IPRs is therefore monopoly over commercial exploitation of the idea/information, for a limited period. The stated purpose of IPRs is to stimulate innovation, by offering higher monetary returns than the market otherwise might provide.

Intellectual Property Rights like patents, copy-rights, designs and trademarks are being conferred upon people or organizations all over the world on three major grounds –

(1) It is generally believed that creative activities/inventions will not get generated in economically adequate measure for public use without economic incentives.
(2) Sufficient economic benefits will not accrue to people who generate such activity, without some sort of monopoly power being granted to them at least for some time.
(3) It is taken for granted that IPR regulations ensure such special economic benefits to those individuals/organizations indulging in creative activity using their special talents.

Patents - The basic principle of the patent system is that an inventor must be granted a statutory monopoly to exploit his invention upon making a full disclosure of what he has invented. The maximum period for which a patent is granted is supposed to be long enough to give the patentee a reasonable opportunity to exploit the invention. A patent is granted only for an invention that is new and relates to a useful process or product, and is therefore capable of being exploited industrially. Because of the patent system, there is an incentive to inventors who hope for returns from their inventions; the exploitation of the patent gives the public the opportunity to utilize a new product or process and since the patent is published, the knowledge is available to everyone.

It is clear that there are positive aspects of the patent system in terms of principles. What are in question are the details. In 1993, several microorganisms were taken from India by American pharmaceutical companies without any intimation to Indian authorities, and were patented by them. What should rightfully have been thought of as the property of nature, or of India, was claimed as the property of some private corporations sitting thousands of kilometers away from their place of origin. In the US, these corporations now have the monopoly right to use these microbes for industrial applications. If their patents get worldwide recognition, even Indians seeking to use these microorganisms will have to seek the permission of these American firms, and pay through their noses for the privilege. This small incident of gene theft illustrates many of the complex policy issues plaguing the world of biodiversity conservation and sustainable use.

Biodiversity is a complex topic, cutting a range of disciplines and sectors. The topic is scientific, technical, emotional, and socially and legally significant. Biodiversity is the new buzzword, the magic door to international funding and global traveling. The word 'Biodiversity', short hand of biological diversity is a collective term that encompasses not only wild flora and fauna (wildlife), but also domesticated plants and animals. Wild flora and fauna include species which are relatively untouched by humans, whereas domesticated plants and animals include those whose evolution and/or behaviour are substantially influenced by humans. More commonly known terms for these would be

wildlife (animals, plants and micro-organisms found in nature) and domesticated diversity (crops and livestock).

Biodiversity includes each and every phase of plant and animal life from DNA to the Biomes. It denotes the variety of life forms, the other ecological roles they perform and the genetic diversity they obtain. It is difficult to assess the importance of biodiversity in concrete terms. Biodiversity plays a vital role in our daily life. It is the base of our food, medicine and clothing. Even the dream of fruitful agriculture or fisheries is meaningless without the existence of biodiversity. Not only do poor countries depend heavily upon biological diversity, but also countries like the US extract a significant part of their Gross Domestic Product (GDP) from wild species, and many medicines contain active ingredients from plants. The utility of biodiversity is not confined to monetary values alone; it has manifold direct and indirect uses.

There is growing concern for the extinction of biodiversity because of the ways in which extraction of natural resources is being carried out and the disruption caused by the unprecedented growth of the human species in the ecosystem. At the present rate of extinction of wild life estimated to be one species per day to one per hour, over $1/10^{th}$ of all species inhabiting the earth will vanish within the next 2 to 3 decades.[3] There may also come a time when human beings will be the only species left on earth. It is now an accepted fact that utilization and conservation of biological diversity cannot go hand in hand.

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[3] *The Times of India, Ahmedabad, dt 29 3 04*

A concern for biodiversity has profound implications for the way we as human beings view the world, the way we go about meeting our needs, and the way we "develop" to improve our "standard of life".

But in the name of development or improving the standard of life, the biological resources of one country cannot be made freely available to another country, in the spirit of "common human heritage". It raises serious issues like whether countries should have the right to demand appropriate financial and other returns for the transfer of their genetic material. Do humans have the right to patent other life forms? Should private monopoly rights be allowed on biological and genetic resources, or on knowledge and technologies related to these resources? What kinds of rights should local communities, who have nurtured and developed biodiversity for much longer than modern societies, have vis-à-vis resources and knowledge? If equality and justice are the basic goals to which all societies ought to strive, how can these goals be achieved in the context of biological resource use?

Even more so than in the case of conservation, these issues are obviously in the realm of the social, political, and economic relations between countries, communities and corporations. Some of the major conflicts and complications in these relations, and the kinds of answers which people are groping for, are explored in this study.

1.2 Need for Intellectual Property Rights

Intellectual Property Rights (IPRs) form a cornerstone of the knowledge economy. Society has chosen to reward the inventor of useful knowledge by granting a limited monopoly on its exploitation. In the modern world, this provides the opportunity to generate a profit on money spent on research and development, either through excluding potential competitors from using the products of such research, or by charging others to use them through licensing deals. By rewarding, and thus hopefully stimulating, scientific endeavour and technological innovation in this way, IPRs — in the form of patents, copyrights and trademarks — have come to perform a vital function in the global economy.

Basically, IPR legislation is intended to create a balance between private and public interests. While formulating IPR rules, legislators and policy makers must ensure that the rights and obligations of producers and users of intellectual property are balanced with the social, economic and developmental objectives that the IPR laws are meant to support.

One of the biggest advantages of the patent system is that it discourages industrial secrecy. Publication of the full details of an invention and how it works is one of the conditions for granting a limited monopoly over its use, which fuels the growth of new inventions by providing a base for further innovation by

others. IPR legislation also provides levers, through compulsory licensing clauses, to ensure that potentially valuable inventions are put to use.

But as the economic importance of IPRs has grown, public controversy over the economic, social and legal consequences of the rules under which the protection of intellectual property is granted and administered has also grown. Some of the controversy has focused on situations in which the monopolies granted under these rules are considered to be too generous, or allow for an excessive concentration of economic and industrial power. Other conflicts, particularly in the life sciences, have arisen around the definitions of what can and cannot be described as a human invention, and is therefore considered eligible for patent protection.

Developing countries have become particularly sensitive to such controversies. The need for economic growth has led to the increasingly widespread acceptance of the economic models on which this growth has occurred in the industrialized nations. And this includes the need for IPR regimes that not only reward individual ingenuity and inventiveness, but also — perhaps even more importantly — provide encouragement and protection for the investors that supply the financial backing for the research involved.

1.3 Flaws in the IPR-Incentive link

The advocators of IPRs always harp upon the myth that the invention will not take place if the inventor is not suitably rewarded, but all that glitters is not always gold. There are two major faults in the IPR-innovation link. It is quite obvious and within the knowledge of everyone that much innovation and technology development has occurred in the total absence, or profound uncertainty about the availability, of IPRs. A glaring example of this is the innovation that has taken place in the developing countries particularly in the field of biodiversity, on whom even the developed countries like the US depend for food, medicine, shelter and clothing, without any IPR protection. The farmers of developing countries have never treated their germplasm as private property, but have shared it freely so that further innovation would benefit both themselves and others.

Another major flaw in the IPR-innovation link is the ideological emphasis placed upon IPRs as the preferred incentive system for innovation. There are in fact already many incentives for innovation such as subsidies and tax benefits, and fiscal incentives offered by the government, with the objective of encouraging research and development (R&D) in the private sector. Absence of patent protection for biotechnological innovations in many countries proves how hollow this argument is. Most firms prefer to use lead-time and secrecy to protect their intellectual property instead of public disclosure of the invention as required by patent rights. This practice is on the rise. As one study of the situation in the Asia-Pacific Economic Community

(APEC) countries put it, 'Intellectual property policies are not the only, nor necessarily the most important, government policy affecting innovation. The ratio of patents to real research and development expenditures in the United States and elsewhere has been declining.'[4]

Though Trade Related Aspects of Intellectual Property Rights (TRIPs) claims that IPRs as incentives have a universal application, many feel that the imposition of IPRs on the developing countries will have disastrous implications for indigenous innovation and their economies. The presence of foreign-generated products on the domestic market will undermine demand for locally produced counterparts, thus subverting local innovation. Furthermore, TRIPs requires countries to legally treat the importation of IPR-protected goods and services as actual working of the invention in the importing country. This will prevent local entrepreneurs from accessing the technology except in its finished form and will thus further stifle innovation in the developing countries. It will have far-reaching adverse effects on the country's health sector.

It is not often recognised how much Intellectual Property Rights as a so-called incentive to innovate work as a disincentive. Broad patents can have the perverse effect of stopping R&D. The expansion of IPRs to biodiversity in the industrialised countries causes a reduction in the flow of both genetic resources and

[4] *Ronald Hirshorn, 'Foreign Direct Investment and Market Framework Policies Reducing Friction in APEC Policies on Competition and Intellectual Property', Strategis, No 4, October 1996, Canada, http //strategis ic gc ca*

information, especially in the plant sector. As a result, access to scientific information will diminish in the developing countries. This will erode the capacity of developing countries to generate indigenous technologies. This will leave national scientists with few better options than working for Trans-National Corporations (TNCs). Once scientists or researchers of a developing country, they will be slaves of giant Multinational Corporations (MNCs). Their position will be no better than bonded labourers.

1.4 Meaning of Patent

A patent may be defined as a legally enforceable right granted by virtue of a law to a person to exclude for a limited time, others from certain acts in relation to a described new invention, the privilege is granted by a Government authority as a matter of right to the person who is entitled to apply for it and who fulfils the prescribed conditions.

Hence, patent rights simply mean exclusive rights to use or sell a new invention or know-how. A patent is a means of allocating ownership, assigning control, regulating access and appropriating benefits. The basic foundation for all patent laws is that patents can only be granted for inventions that are novel, non-obvious and useful.

The basic principle of any patent law is that monopoly is granted only for inventions which are new and useful and which have industrial applications. Therefore the provisions of the patent law of a country lay down the criteria for meeting these

requirements. The statute generally specifies which inventions are patentable and which are not, in clear and precise terms. The invention for which a patent should not be granted is normally decided, taking into account the interests of national economy and national health or well-being.

In the earlier days, it was considered that industrial application of the inventions that were developed by an inventor was possible only by the application of the tools of physical and chemical sciences. The application of biological sciences for such purposes was never considered possible. In addition, the grant of patents was confined to inanimate things and not to animate or living things.

The advent of fermentation technology utilizing biological materials such as strains and microorganisms revolutionized the above concept. This resulted in a modification of the interpretation of the provisions and changing the practice followed, to allow for protection to such technologies.

New developments in genetic engineering, microbiology and biotechnology, i.e. the ability to select and manipulate genetic materials, have created great interest in the commercialization of such inventions. Biotechnology includes any technique that uses living organisms or their parts to make or modify products to improve plants or animals, or to develop microorganisms for specific uses. A consequence of biotechnology development is the creation of inventions that are themselves alive and are

commercially valuable. Patents are vital to protect the commercial interests of such inventions, and the patenting of new life forms raises arguments in favour of and against the issuance of such patents. The developments in these fields on the one hand, and the attempts of multinational corporations to make huge profits on the other, have divided the world into two polarized groups – one consisting of the US and West European countries, having modern facilities for R&D, and the other group, mostly of Third World countries like India, having a rich base of biological diversity. If the developing countries do not come forward with a unified approach and feasible options, their economic future will certainly become mortgaged to the MNCs of the economically powerful countries.

1.5 Origin of Intellectual Property Rights

Though it is believed that 'Intellectual Property Rights' is the new catchphrase of the 20th century, the basic concept of intellectual property can be traced back as far as the 4th century B.C. to Aristotle. But the history of the patent system goes back still further in time to the 7th century B.C. when the Greeks began granting short term exclusive rights to cooks to prepare new recipes in order that the others might be induced to labour at excelling in such pursuits; but the global adoption of the system gradually increased in the course of time. It spread to the State of Venice in 1474, England in 1623, the US in 1790, France in1791 and Sweden in 1819. In India there was an old patent law whose origin dates back to 1856.

The advocators of Intellectual Property Rights come forward with two main moral and philosophical arguments for rewarding innovators. Their main argument is that the invention will take a back seat if the innovators are not duly rewarded. One argument stems from Hegel that an idea belongs to its creator because the idea is a manifestation of the creator's personality or self, the other from Locke- that the unpleasantness of labour should be rewarded with property[5]. However the present system of Intellectual Property Rights goes back to the English system, which in turn is rooted in old practices of the kingdom. In medieval times, the English Crown granted patents in order to raise funds and to secure control over the industries that were considered to be of political importance.

The grants of monopoly covered a variety of industries, including everyday items such as production of salt and leather. The processes protected did not need to be novel. Furthermore, there was only a weak differentiation between production monopolies and import franchises. This shows the purely political origin of these monopolies. Protecting the interests of inventors and other intellectual workers does not seem to have been an important concern of the kingdom.

Understandably, the restrictions of this pervasive monopoly system eventually became so intolerably burdensome that they resulted in widespread dissatisfaction and unrest in the population. This situation finally led to the prohibition of the old

[5] *Richards, D G 'Review of Social economy' vol 60, No 4 Dec '02, p 521-541*

system, a change formulated in the "Statute of Monopolies of 1624". In our country too the levy imposed on salt during the British rule was a kind of Intellectual Property Right conferred on the Crown. A protest initiated against such a right by Mahatma Gandhi metamorphosed into a big freedom struggle, ultimately leading to the freedom of the country. In the 19th century, we could successfully protect the interests of millions against the arbitrary and politically granted IPR, but are finding it difficult to protect our rich heritage, biodiversity, traditional knowledge and the interests of billions of countrymen from the onslaught of IPRs in the 21st century.

Patents and technology may be regarded as complementary characters of a dynamic and economically progressive country. At present, in many countries of the world, some system or other is prevailing for the grant of patents for rewarding inventors.

However, in the earlier days, patents were granted only for inanimate things and not for animate or living things. In all the enactments of the patent law, living organisms were kept out. This was not due to any religious beliefs or ethical considerations, but because of the fact that living organisms of plant and animal species were considered to be the 'common heritage' of mankind.

Then in 1980, the US Courts allowed the patenting of microorganisms[6], in 1985 patent protection was granted to a

[6] *US Patent no 4259444 dt March 31, 1981 to Ananda Chakravarthy*

plant[7] and in 1988 to a mouse[8]. After that, similar laws were enacted by many other countries. This heralded a new kind of bio-battle between opposing interest-laden countries. The developing countries obviously perceived it as a threat to their living resources, which became evident in later years when the US tried to push its interests in the form of TRIPs in the Uruguay Round of GATT negotiations.

If patenting of living resources is allowed and is enforced, most of the developing countries will be placing their economies at the mercy of the US and its allies and their profit-hungry Multi-Nationals. Not only the economy but also the ecology of the biodiversity-rich developing countries will be adversely and permanently affected. There is therefore a need for cautious, long-term and well-thought out policies on behalf of the developing countries, to defeat the evil motives of the proponents of the new patent system. Patenting and biodiversity are complex issues and it will require sophisticated, scientific and legal know-how, if the poor countries are to get any benefit from them.

In the final analysis, any decisions made about patents will invariably influence our ability to preserve genetic resources. Here the link between environmental conservation and economic development and international justice should be recognized and given its due importance and the developing countries should not be placed at the mercy of the developed countries.

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[7] *Patent no EP 301749*
[8] *US Patent no 4736866 dt April 12, 1988 to Harvard College*

1.6 Scope of the Study

Human life is not possible without air, water and food. Plants, animals and microorganisms recreate the quality of the air that we breathe, the water that we drink and the soil that produces our food. They recharge and regenerate the basic necessities that make life possible on this planet. Even before the invention of present medical science, plants were providing the natural ingredients for medicines that cured human illnesses for over three-fourths of the human population. Thus they don't just sustain human life; they elevate us from merely 'existing' to 'living'. Hence it becomes our ethical, moral and legal responsibility to conserve biodiversity and be concerned about its destruction. This study persuades us to be serious about biodiversity. While biodiversity has made life possible, human history has tended to erode this diversity. On the one hand, biodiversity nurtures life; on the other, human beings tend to destroy this very biodiversity. Human beings have always strived to conquer Nature, and the commercial age has transformed Nature into a resource to be used and exploited for sale and profit, opening up the animal and plant world to limitless expropriation.

IPRs are important to encourage inventors, thereby making human life more meaningful. However, it cannot be at the cost of biodiversity which is the basis of any life. With IPRs being one of the widest areas of today's legal system, the scope of this study is limited to its interface with biodiversity only. Other aspects of IPRs are not discussed in this study.

1.7 Objective of the Study

- To explore in detail the complex issue of patents with respect to biodiversity.
- To study the implications of the free flow of genetic material from the tropical countries to the Western countries, and the dependence of the tropical countries on the West for the transfer of biotechnological products.
- To examine the effects of extension of Intellectual Property Rights to allow patenting of everything that is genetically engineered or produced by humans, not occurring in Nature.
- To demonstrate the harmful implications of allowing patents on innovations in crop and animal species.
- To prevent the devastating effects of patenting crops and animals such as killing of local innovation, destroying local knowledge, disrupting community life, homogenizing production and restricting biodiversity.
- This study aims to prevent the destruction of genetic diversity.
- Protection of local knowledge as common property and stopping its private appropriation by multinational corporations.
- To build up a meaningful conservation policy not only on the support of specific local communities directly connected to their environment, but on a wider public awareness of the nature of the problem, and a generalized rethinking on the developmental trajectory of our society.

- To understand the question of Biodiversity and to think of measures essential to conserve Nature.
- To study the Indian legislation and International Covenants on Intellectual Property Rights and their effects on Biodiversity.
- To study the effects of International Covenants on IPRs specifically related to Biodiversity, on the Indian economy.
- To study the shortcomings of Indian legislation and International Covenants on IPRs for its effective conservation of Biodiversity.
- To provide remedies to bring about harmony between IPRs and Biodiversity.

1.8 Hypotheses of the study

Keeping in view the broad objectives of the study and the problems projected in protection of biodiversity from the onslaught of Intellectual Property Rights, the following hypotheses have been formulated-

- Lack of legislations, suiting the needs of both developed and developing countries, has created a wide gap between two diverse but equally important terms, namely Intellectual Property Rights and Biodiversity, the former an integral part of the development of human beings, and the latter guaranteeing the survival of it.
- Because of the amended statutes in the field of Intellectual Property Rights, particularly General Agreement on Tariffs

and Trade (GATT), there is an increased threat to Biodiversity.

- To ensure the conservation of Biodiversity, Traditional Knowledge (TK) must be protected from the ambit of patenting.
- Patentability of genetically modified crops threatens Biodiversity.
- The emerging trend of patenting life forms result in the destruction of Biodiversity.
- Amendments in legislations and expansion of meaning of patentability have resulted in minimization of liberty guaranteed under the *'sui generis'* system to developing countries.
- Biodiversity laws in India need to be brought at par with the Convention on Biological Diversity (CBD), since legislations have failed to achieve their objectives.

1.9 Research Methodology

IPRs, especially patents have social, economic and legal repercussions not on any isolated country, but on the whole world and the people in general. Since the study is socio-economic and legal in nature, historical and doctrinal methods have been adopted, because it cannot be properly conducted purely by the experimental or non-doctrinal method.

The relevant data and information are collected from statutory enactments, published rules of National and International Conventions and Rules evolved by the judiciary from time to time

in specific cases relating to patents and biodiversity. The relevant material is thus collected from various primary and secondary sources. Material and information is collected from both legal sources and socio-economic sources like original judgments of various National and International Courts, published works, National and International Journals, Research Papers presented at National and International Seminars, views expressed by NGOs, websites, etc. A comparative analysis has been made of various National Legislations and International Conventions and Instruments.

1.10 Scheme of the study

This study reviews the complexities and uncertainties surrounding the impact of the current multilateral Intellectual Property Rights regime, on plants and animals, on plant variety protection systems, and on food security and agricultural biodiversity. These ambiguities caution against any strengthening of such rights until their effects on the biodiversity of the developing countries are assessed, which ultimately affect the economy of the country. This study aims to deal with the legal effect of IPRs mainly Patents on Biodiversity.

Chapter 1 This chapter outlines the scope and objective of this study. It examines the meaning and need of IPRs, particularly patents, their origin and role in market economics. It also briefly examines the meaning of Biodiversity. It details the area of, and hypotheses formulated for, the study. It describes the methodology adopted for the study, and the scheme and utility of the study.

Chapter 2 describes the importance and general aspects of Biodiversity. The meaning and its effects are dealt with in detail. This chapter is focused on the benefits of biodiversity and the need for its conservation. The issues related to the threats to biodiversity which may lead to its destruction are discussed in detail.

Chapter 3 delves into the history of IPRs and Biodiversity. It examines the relation between IPRs and Biodiversity and details the conflict of biodiversity with patents in particular. Plant patents and their impact on biodiversity are critically analysed in this chapter. It also takes a look at the contribution of the developing countries to the biodiversity of the world.

Chapter 4 discusses in detail the concept of *'sui generis'* system for plant protection. The burning issue of seed piracy and biopiracy and its remedy is dealt with in this chapter. The implications of TRIPs on the seed sector are reviewed here. The concept of Traditional Knowledge and its patentability are also discussed in this chapter. The need to protect Traditional Knowledge from the onslaught of patents is dealt with in detail.

Chapter 5 covers Genetically Modified (GM) crops and their ultimate effects on farmers and plant varieties. It describes the potential benefits and problems of GM crops and examines the issue of their patentability. It also deals with bio-farming and its risks to consumers, farmers, food companies and the environment.

Chapter 6 looks at the broader picture – the legal, moral and ethical issues raised by patents over life-forms; the nature of invention and clashes with different cultural and belief systems; the balance between individual private rights and communal public rights; and, the lack of equity in international negotiations. In economics, the issue of technology transfer and R&D priorities are highlighted while the environmental issues spotlighted are those relating to the links between patents and the rapid development of genetic engineering. Finally, the potentially disruptive effects of 'Genome' on human values are also noted.

Chapter 7 examines the National Legislation and International Instruments on IPRs with respect to Biodiversity, the provisions of these legislations that permit exceptions from patentability for plants, animal and biological processes, and includes the requirement for a *'sui generis'* system of IPR protection for plant varieties or use of patents or both. It provides a critical analysis of the related legislation and its fiscal, legal and market implications.

Chapter 8 prescribes the remedies for harmonizing the relationship between Intellectual Property Rights and Biodiversity. A need to create a win-win situation in the emerged bio-battle between Intellectual Property Rights and Biodiversity is dealt with in this chapter. It also contains recommendations and a brief conclusion followed by Bibliography that lists the key source materials used, and Acronyms.

1.11 Utility of the Study

The present research work is carried out by the researcher keeping in mind the importance of Intellectual Property Rights to fuel the research activities in the field of science and technology and other related areas and the importance of biodiversity which is essential to sustain and to make human life more meaningful. In this study an attempt has been made to strike a balance between these two poles of human life. The research work will be helpful in bringing awareness about the importance of Biodiversity and its protection. The research work will also be useful in protecting the vast traditional knowledge of ancient Indian heritage and its effective commercial application which will ultimately improve the economy of the country and its millions of poor who are rich in knowledge. This study will also be useful to academicians, environmentalists, NGOs and policy makers besides students and professionals practising in the field of IPRs. However, the ultimate utility of the study will be attained when IPRs will be used for the protection of Biodiversity and not for its piracy or destruction.