7.1 Introduction

A comparative analysis on hazardous and solid waste management laws in developed and developing countries gives a better knowledge to understand our legal system. It is often quoted that Aristotle collected more than 150 city state constitutions in the 4th century BC for devising a model constitution for Greece. Therefore, the method of comparative law for understanding and improving law dates back to the ancient times. Zweigert and Kotz have defined the subject of comparative law as “an intellectual activity with law as its object and comparison as its process”. The basic methodological principle of all comparative law is that of functionality. Incomparable cannot usually be compared and in law the only things which are comparable are those which fulfil the same function.

There are three main stages involved in the process of comparison which are the descriptive phase, the identification phase, and the explanatory phase. The descriptive phase includes description of norms, concepts, and institutions, the identification phase includes identification of differences and similarities of the systems and the explanatory phase identifies probable transplantation of ideas, law and institution. This approach seems quite useful in the present study.

7.2 Environmental Protection in Developed Countries

7.2.1 United Kingdom (U.K)

Constitution and Environment: The Indian constitution is amongst the few in the world that contains specific provisions on environmental protection. The directive principles of state policy and the fundamental duties chapters explicitly enunciate the

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national commitment to protect and improve the environment. Judicial interpretation has strengthened this constitutional mandate. In the case of *Tarun Bharat Sangh Alwar v. Union of India*\(^2\), the Supreme Court had ruled that 'the issues of environment must and shall receive the highest attention from this court'.

Under the Indian constitution Article 48-A says 'the State shall endeavor to protect and improve the environment and to safeguard the forests and wild life of the country. Article 51-A (g) in a new chapter entitled 'Fundamental Duties', imposes a similar responsibility on every citizen to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures. Although non-enforceable by a court, the directive principles are increasingly being cited by judges as complementary to the fundamental rights. In several environmental cases, the courts have been guided by the language of the Article 48-A. An instance is the case of *M.C. Mehta v. Union of India*\(^3\).

Fundamental rights under the constitution have served a quick means of relief to people in cases of the environment pollution. Right to life and personal liberty guaranteed under Article 21 has been interpreted by the Supreme Court to also include right to a wholesome environment. The Supreme Court and the High Court’s under Articles 32 and 226 of the constitution have expanded the scope of providing relief in cases relating to environmental pollution and resource degradation.

UK's unwritten constitution does not provide any express reference to the environmental protection though common law rule for the same has been in existence for long. But the European Community (EC) law has filled up the constitutional gap. The Community's environmental policy began with recognition at the Paris Summit in 1972 of the fact that economic expansion is not an end in itself but a means to obtaining an improvement in the quality of life. However, no Treaty provision provided expressly for the adoption of legislation to protect the environment. The gap was filled by the general powers to legislate contained in EC Article 94 (ex Article 100) and EC Article 308 (ex Article 235) until the adoption of Single European Act (SEA), which inserted a

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\(^2\) 1993 SCR (3)21.

\(^3\) AIR 1988 SC 1037.
new title into the EC Treaty concerned with the environment. Finally, the Amsterdam the Single Treaty amended EC Article 2 so as to include the promotion of a high level of protection and improvement of the quality of the environment as one of the tasks of the community⁴.

There are many ways in which EC can play role in shaping the British environmental law and policy. Some pieces of EC legislation lay down rules and standards that are directly enforceable in member states without any need for further implementation. In these cases, EC law is British Law. Other pieces of EC legislation are addressed to member states and require changes in British law or administrative practice. This is normally the situation in relation to environmental legislation. The EC has its own environmental policy in addition to having environmental laws. This exerts influence on British attitude to policy, laws and enforcement. And economic policies of EC have a profound effect on the direction of both EC and domestic environmental law⁵.

The EC is also signatory to a number of international treaties. Therefore, all member states are duty bound to implement such agreements in their respective countries. The EC has following principles on the environment:

i. To preserve, protect and improve the quality of environment.

ii. To contribute to the protection of the health of individuals.

iii. To ensure a prudent and rational utilization of natural resources.

iv. To promote at international level, measures to deal with regional or worldwide environmental problems.

The EC lays emphasis on attending problem of pollution in air, water, land and issues relating to natural resource, conservation and access to information etc. The European Environment Agency (EEA) came into being in 1993 as a legal entity.


Environmental Legislations in India and U.K.

India did not have separate legislation on various aspects of the environment, except forests, until the Stockholm Conference of 1972. In contrast, the environmental laws in the UK have been in existence since the enactment of the Alkali Act 1863. Now India and the UK have in place appropriate legislative measures to protect the environment.

The main points emerging from the comparative account of the environmental laws are efficacy, punishment, nature and problem of wastes.

Efficacy of the Environmental Laws

Britain was the first country to industrialize so it was also the first country to address the environmental problems both at the level of legislation and institutions. The UK has been prudent in quickly reversing the trend of environmental degradations by systematic efforts both at the level of evolving policies and legislation. India is now facing environmental problems and resource degradation on a massive scale. Indian environmental laws are not proving effective and on a number of occasions enforcement has been induced by the higher judiciary namely the Supreme Court and the High Courts. It is high time that India learns from the experience of the UK in redesigning the environmental laws for effective control of the environmental problems.

Public-spirited citizens under Article 32 of Indian Constitution filed most of the leading cases in India on air and water pollution. Legislative frameworks on air and water have not been invoked by regulating agencies to the desired extent. In an affidavit, the CPCB even went to the extent of saying that it is mostly busy with administrative matters so the Central Government should notify authority under the EPA 1986 to deal with pollution problems. As a result, more imaginative and interpretative case law under the Air Act and Water Act have not grown in India.

On the other hand the UK has benefited from case law and legislation dating back to 1860s when the Salmon Fisheries Act 1861 was enacted. Later enactments like the Rivers Pollution Act 1876, the Public Health Act 1875, the Rivers Pollution Prevention Act 1961, the Control of pollution Act 1974, and the legislation enacted after 1990 have only added to that. Environmental laws in India need to be used more by the enforcement agencies than public-spirited citizens performing that function.
Nature of the Environmental Laws

A perusal of the Air (Prevention and Control of Pollution) Act 1981 reveals that it is mostly concerned with the administrative details of composition of the State Pollution Control Boards, their powers and functions. While the Clean Air Act 1993 in the UK actually concentrates on operational aspects of pollution and the mechanisms of control. It even addresses issues, which are related to other Acts namely the EPA 1990 insofar as air pollution control is concerned. Indian environmental regime relies excessively on delegated legislation and the Government does not issue guidance notes for the help of the staff and the related public. In the absence of such notes the enforcement officials are mostly in dark about the course of action to be taken in many events. In the UK, such guidance notes in fact supplement the statutes and add to the efficacy of the related laws.

Air Pollution Laws

The Indian Air Act 1981 draws its inspiration from the Stockholm Conference. While the UK’s Clean Air Act 1993 is the culmination of a large number of legislation starting from the Public Health Act of 1875 and 1936 and the Public Health (Smoke Abatement) Act 1926. This Act successfully improved the air environment of the UK as borne out by the White Paper on the Environment 'This Common Inheritance 1990'. The situation in India is that most of the leading cases of air pollution, (for example the Taj Mahal case) were on article 32 of the constitution rather than the Air Act.

Problem of Waste

The Environmental Protection Act (EPA) 1990 in the UK formally established a waste management regime and a statutory duty of care. But after the enactment of the Environment Act 1995, a shift from waste disposal to waste management has taken place. The Environment Agency has the necessary power to issue waste management licenses. The Agency can revoke a license where it appears to it that the holder of the license has ceased to be fit and proper person or the continuation of the activity would cause harm to the environment or human health. Under the provision of the Special Waste Regulations 1996 in England the movement of 'special waste' from the waste producer's premises has to be pre-notified to the agency. This provides an opportunity for the Environment
Agency to check if the suggested disposal plant is suitable under its site license conditions to take in the waste load and to avoid consignments of special wastes from disappearing into unlicensed sites\(^6\).

The EPA 1990 also establishes a regime of duty of care. This is very much a forward looking feature in the legislation for the simple reason that impact of waste on environment is significant.


**Problem of Water Pollution**

Control of pollution of water in the UK is addressed under the Water Resources Act (WRA) 1991. There is no overall statutory national strategy as found in the air quality and waste management sector. However, the Department of the Environment in England has started the process. Offences under the Water (Prevention and Control of Pollution) Act 1974 in India have been given under section 24. This relates to causing pollution in any stream, or well or sewer or on land. The term “stream” has been defined to include river, watercourse, inland water, sub-terrain water or sea or tidal waters. On comparison of the section 104 of the WRA 1991\(^7\) (defining controlled waters) with section 2(j) of the Indian Water Act 1974\(^8\), it is found that the former is more comprehensive to address incidents of pollution.

**Forestry Laws**

Government of India has still not succeeded in bringing a modern forestry Act despite having announced a progressive forest policy in 1988. Many sections of the

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\(^8\) Available at: [http://www.moef.nic.in/legis/water/wat1c1.html](http://www.moef.nic.in/legis/water/wat1c1.html), (visited on 27.11.2014).
Indian Forest Act 1927 are in contradictions with some acts namely the Forest (conservation) Act 1980. The Forest Act of 1927 does not reflect principles of sustainable forest management even by amendments. The position in the UK is a lot more progressive. The Forestry Act 1967 is supposed to promote sustainable forestry. The Forestry Commission was brought under a duty in 1985 to endeavour to achieve a reasonable balance between the development of afforestation, the management of forests and the production of timber and the conservation and enhancement of natural beauty and conservation of flora, fauna and geological and physiographical features of special interest. Further, the UK's Biodiversity Action Plan takes conservation aspects much ahead of India. There is an urgent need to restructure the Indian Forest Act 1927 in tune with the Forest Policy of 1988.

**Punishment**

Most of the environmental laws except the EPA 1986 in India prescribe only small fines while in the UK it is up to £20,000 in cases of serious violations. This is a draconian punishment.

**The Enforcement machinery in India and U.K.**

The Union Ministry of Environment and Forests (MoEF), constituted in 1985, is headed by a Union Minister who is assisted by a Secretary to the Government of India and a Director General of Forests. The MoEF is the nodal agency at the central level for planning, promoting and coordinating environmental programmes in addition to policy formulation for the environment, forestry and wildlife sectors. The MoEF is responsible for formulating legislation in the above areas for sound environmental management and pollution abatement. The MoEF is assisted by six regional offices located in the country. Among many autonomous institutions under the MoEF, the Central Pollution Control Board (CPCB) is important. This discharges executive and advisory functions.

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The State’s Department of Environment and Forests perform similar executive functions at the state level as MoEF does at the Centre. The State Pollution Control Boards (SPCB) in various states likewise performs executive and advisory functions.

In U.K. the power to lay down policy and rules in environmental matters lies with the central government through the Department of the Environment, Food and Rural Affairs (DEFRA). However, other departments of the Government also play an important part in laying down policy in environmental matters. Government departments such as the Department of Trade and Industry (in relation to energy) and the Treasury (in relation to economic instruments) play a significant role in environmental matters. In addition to the above, there are bodies in existence as part of the 'Greening Government' initiative. Mention may be made of the House of Commons Environmental Audit Committee, the Cabinet Committee on the Environment, the Green Ministers Committee etc. Besides these, the Parliamentary Select Committee and the Royal Commission on Environmental Pollution (RCEP) play significant part in shaping environmental law and policy in the country. Because of the framework nature of much environmental legislation, the Secretary of State has wide legislative and quasi-legislative powers. This power has been conferred on the Secretary of State for not only updating the law but also to comply with the EC requirements. However, day-to-day control of the environmental matters in England and Wales lies with the Environment Agency (EA).

Judiciary and Environmental Protection

The Indian Supreme Court has ruled in a number of cases that right to life includes right to a healthful environment. In the UK, now the courts are also deciding environmental matters brought before them not only under the specific environmental laws but also the Human Rights Act 1998. Generally it can be said that 'degraded physical environments contribute directly to infringements of the human rights to life, health and the livelihood, acts leading to environmental degradation may constitute an immediate violation of internationally recognized human rights'\footnote{Boyle Alan and Anderson Michael, Human Rights Approaches to Environmental Protection, 3 (Oxford University Press: Clarendon Press, 1998).}. "Courts then are institutions already engaged in the task of environmental management; they have a considerable history in so doing".
Close linkage between human rights and the environment has been recognized internationally with the publication of the final report of the 'UN Sub-Commission on Human Rights and the Environment' in 1994. The European Convention of Human Rights (ECHR) and the Human Rights Act 1998 would therefore increasingly play vital role in environmental cases brought before domestic courts in the UK, while the Indian Supreme Court and the High Courts are already on a chartered path of judicial activism in correlating environmental protection and human rights.

India's higher judiciary has invoked their writ jurisdictions and have expanded the scope of public interest litigation in their attempt to improve compliance with the environmental laws as well as to achieve the constitutional mandate relating to environmental protection and fundamental rights.

Both India and the UK have almost similar judicial systems, laws and procedures what Zweigert and Kotz (1987) calls functionality. In comparing two legal systems the laws should perform the same function. This is the broad meaning of functionality12.

The remedy of tort as a measure of environmental protection has not developed or been used in India on the scale as used in England. However, India being one of the main common law countries and its judicial and legal system founded on English system, tort has been used to provide, a clean and healthful environment.

The inalienable common law right of every person to a clean environment was traced by the Supreme Court in Vellore Citizens welfare Forum v. Union of India13 by quoting from the Blackstone's Commentaries on English Law of Nuisance published in 1876: "...since the Indian legal system was founded on English common law, the right to a pollution free environment was a part of the basic jurisprudence of the land"14.

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13 AIR 1996 SC 2715.
Common forms of tort developed in India for environmental protection are nuisance, negligence and strict liability. But the Supreme Court of India has added a new class of tort based on the principle of 'absolute liability' following the Bhopal gas tragedy.\(^{15}\)

Probably more than any other jurisdiction on earth, the Republic of India has fostered an extensive and innovative jurisprudence on environmental rights. This has led to the growth of public interest litigation in India sometimes also called 'social action' litigation. The Indian Supreme Court and the High Courts have been at the forefront of evolving this rights based approach to the environmental protection. The courts in the UK have favoured compliance with relevant environmental laws rather than developing social action litigation. The UK judiciary also does not favour judicial activism, as the social divide in the UK is not as wide as in India giving less scope to judges to favour public interest cases.

The position in the UK with regard to the public interest litigation is different. Litigation to protect the environment is minimal because discretionary power is broad and largely non-justifiable and the obstacles to citizens to take developers or polluters to court are substantial. Probably the greatest disincentive to an environmental group in a public interest case is the question of payment of costs. However, recent trend in English courts is that costs are not awarded if applicant had acted in public interest. In *NZ Maori Council v. AG of New Zealand*\(^{16}\) the Privy Council advised that no order of costs should be made against the applicants which had brought the case in public interest. Likewise in *R v. Secretary of State for Environment, ex parte Greenpeace Ltd*\(^{17}\), no order to costs was made as the applicant brought the case in the public interest. Costs will cease to be disincentive only if the claimant knows, before the litigation begins, that it will not be liable to pay the winners the costs. But English courts are not keen on making such pre-emptive costs orders. Another reason for the PIL not growing in the UK on the Indian scale is that the society does not have very strong polarisations in terms of wealth, position and power. This gives little scope to the judiciary to become activist.

\(^{15}\) *M.C.Mehta v. Union of India* AIR 1987 SC 1086.

\(^{16}\) (PC) (1995) 1 WLR 1176.

\(^{17}\) (1994) Env. LR401.
The Supreme Court and the High Courts of India have evolved rights based approach in public interest cases relating to the environment and in the process have developed a novel environmental jurisprudence. Within the UK, the traditional system of environmental regulation has not favoured growth of this liberal attitude by the judiciary. However, enactment of statutes namely the Human Rights Act, 1998, the Freedom of Information Act, the devolution in governance and a move towards a more formal and participative style of the environmental regulation are clear signs of development of a system more conducive to the growth of rights based approach by the judiciary in the UK.

7.2.2 United States of America (USA)

With congressional approval, the Nixon Administration established the Environmental Protection Agency (EPA) in 1970 under an executive branch reorganization plan, which consolidated numerous federal pollution control responsibilities that had been divided among several federal agencies. EPA’s responsibilities grew over time as Congress enacted an increasing number of environmental statutes and major amendments to these statutes. EPA’s primary responsibilities have evolved to include the regulation of air quality, water quality and chemicals in commerce; the development of regulatory criteria for the management and disposal of solid and hazardous wastes; and the cleanup of environmental contamination. The implementation and enforcement of many of these federal authorities is delegated to the states. EPA also provides financial assistance to states and local governments to aid them in administering pollution control programs and in complying with certain federal environmental requirements. Several federal statutes provide the legal authority for EPA’s programs and activities.

The Clean Air Act 1955 (CAA) authorizes EPA to set mobile source limits, ambient air quality standards, hazardous air pollutant emission standards, standards for new pollution sources and significant deterioration requirements; to identify areas that do not attain federal ambient air quality standards set under the Act; to administer a cap-and-trade program to reduce acid rain; and to phase out substances that deplete the Earth’s stratospheric ozone layer\(^\text{18}\).

The Clean Water Act 1948 (CWA) authorizes the regulation and enforcement of requirements that govern waste discharges into U.S. waters and financial assistance for waste water treatment plant construction and improvements. Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act. The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave EPA the authority to implement pollution control programs such as setting waste water standards for industry. The Clean Water Act also continued requirements to set water quality standards for all contaminants in surface waters. The Act made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. It also funded the construction of sewage treatment plants under the construction grants program and recognized the need for planning to address the critical problems posed by nonpoint source pollution. Subsequent enactments modified some of the earlier Clean Water Act provisions. Revisions in 1981 streamlined the municipal construction grants process, improving the capabilities of treatment plants built under the program. Changes in 1987 phased out the construction grants program, replacing it with the State Water Pollution Control Revolving Fund, more commonly known as the Clean Water State Revolving Fund. This new funding strategy addressed water quality needs by building on EPA-state partnership.

The Ocean Dumping Act 1972 focuses on the regulation of the intentional disposal of materials into ocean waters and authorizes related research.

The Safe Drinking Water Act 1974 (SDWA) authorizes EPA to establish primary drinking water standards, regulate underground injection disposal practices and administer a groundwater control program. The Act authorizes EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The 1996 amendments to SDWA require that EPA consider a detailed risk and cost assessment and best available peer-reviewed science, when developing these standards. State governments, which can be approved to implement these rules for EPA, also encourage attainment of secondary standards.
(nuisance-related). Under the Act, EPA also establishes minimum standards for state programs to protect underground sources of drinking water from endangerment by underground injection of fluids.

The Solid Waste Disposal Act 1965 and Resource Conservation and Recovery Act 1976 (RCRA) govern the regulation of solid and hazardous wastes and corrective actions to address improper waste management practices. The RCRA gave EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned or historical sites. The Federal Hazardous and Solid Waste Amendments 1984 required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards and a comprehensive underground storage tank program.

The Comprehensive Environmental Response, Compensation and Liability Act 1980 (CERCLA) commonly known as Superfund Act focuses on the cleanup of contamination resulting from the past release of hazardous substances, but excludes petroleum which primarily is covered under the Oil Pollution Act 1990. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years, $1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. Amendments to the Solid Waste Disposal Act specifically address the cleanup of petroleum leaked from underground storage tanks that are not covered under CERCLA.

The Toxic Substances Control Act 1976 (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act 1947 (FIFRA) require regulation of commercial chemicals to reduce risks to human health and the environment. The Toxic Substances

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Control Act (TSCA) of 1976 was enacted by Congress to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk. Also, EPA has mechanisms in place to track the thousands of new chemicals that industry develops each year with either unknown or dangerous characteristics. EPA then can control these chemicals as necessary to protect human health and the environment. TSCA supplements other Federal statutes, including the Clean Air Act and the Toxic Release Inventory under EPCRA.

The Pollution Prevention Act 1970 (PPA) authorizes various mechanisms intended to prevent pollution by reducing the generation of pollutants at the point of origin. The Emergency Planning and Community Right-to-Know Act 1986 (EPCRA) require industrial reporting of toxic releases and encourages chemical emergency response planning. This law was designated to help local communities protect public health, safety and the environment from chemical hazards. To implement EPCRA, Congress required each state to appoint a State Emergency Response Commission (SERC). The SERC's were required to divide their states into Emergency Planning Districts and to name a Local Emergency Planning Committee (LEPC) for each district. Broad representation by fire fighters, health officials, government and media representatives, community groups, industrial facilities and emergency managers ensures that all necessary elements of the planning process are represented.

Under these and other statutes, Congress has assigned EPA the administration of a considerable body of law and associated programs and activities. It covers the major, basic statutory authorities underlying the agency’s programs and activities and those which EPA has delegated to the states.

7.2.3 Germany

Environmental protection as a constitutional principle: German environmental law is strongly influenced by constitutional law. According to Article 20(a) of the German Federal Constitution environmental protection is a fundamental aim of state policy.

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All governmental and decentralized public bodies are legally bound to this constitutional guideline. However, Parliament has many possibilities to influence environmental policy. There is also no fundamental right to environmental protection which could be claimed before the courts. Neither the fundamental rights to the integrity of the person nor to property ensure a right to a healthy natural environment. Nevertheless Article 20(a) of the German Federal Constitution has an impact on statutory interpretation and serves as a substantial reason to justify limitations of fundamental rights, e.g. the right to property, the right to pursue an occupation, the freedom to conduct a business, the freedom of religion and the freedom of the arts and sciences21.

**Legislative competences**

The German Federal Constitution divides legislative competences concerning environmental protection between the federal level (the Federal Republic) and the regional level (“Lander”). Since 2006, when an important reform of German federalism was enforced, all important areas of environmental law are attributed to the legislative power of the Federal Republic: air quality management, waste management, noise abatement, spatial planning, nature conservation, water pollution prevention, soil protection, hunting and coast protection. In respect to spatial planning, nature conservation, water pollution prevention and hunting the “Lander” may deviate from federal legislation. Traditionally, federal law has priority over regional law. The recently introduced “deviating legislation” changes that customary rule. From now on the lex-posterior-rule prevails in the branches of environmental law mentioned above and legislation of the “Lander” is not bound to the federal statutes any more. Nevertheless they have to observe federal constitutional law and EU-law.

**Statutory Laws**

All important subjects of environmental law are put down in federal laws. Most of these statutes were reviewed in the past few years, notably the Federal Immission Control Act, 2002, the Federal Act on Nature Conservation and Landscape Management, 2010, the Water Resources Act, 2010, the Closed Substance Cycle and Waste Management Act

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(in revision at present, entry into force of the new Closed Substance Cycle Act in 2011), the Town and Country Planning Act, 2008, the Federal Soil Conservation Act, 1998, the Federal Hunting Act ,1976, the Animal Protection Act, 2006 and the Gene Technology Act, 1993. However, the attempt to create a complete Environmental Code including all specific statutes failed once again in 2008 due to political reasons.

There has been a fast development of Environmental energy law in the past years. The Renewable Energy Sources Act (2004/2009) and the Act on the Promotion of Renewable Energies in the Heat Sector (2008) are the main regulations. The cross-section issue of environmental energy law concerns all other parts of environmental law. Primarily environmental energy law comprises the support of renewable energy sources through financial incentives. Main goal is to combat climate change. In Germany the most important renewable energy sources are wind power stations, biogas plants, solar equipments and in some regions hydroelectric power stations.

**Legal duties of individuals and enterprises**

Both individuals and enterprises are subject to many duties concerning environmental protection. Public authorities have empowered to impose appropriate measures. Anybody running an installation has to avoid deterioration of water quality and air pollution. Waste has to be disposed according to specific rules, depending on whether a substance or object fulfils the definition of waste for recovery or waste for disposal. Consequently the respective waste has to be recycled or to be left to the waste disposal authority. Contaminated soil must be cleaned up. Particular legal regulations authorize public authorities to enforce these obligations. In addition to this and corresponding to the polluter pays principle responsible people have to pay damages according to the Environmental Liability Act, 1990 and the Environmental Damage Act, 2007. The burden of proof has been reduced, liability regardless of fault has been agreed upon and damages on biodiversity have to be compensated. At last the administrative rules are completed by fiscal incentives and penalty taxes, the most famous example being the eco-tax on mineral oil and electricity.

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**Procedural environmental law**

The idea of procedural justice gained much importance in German administrative law over the last years. The evolving procedural approach can be recognized first of all in environmental law. The most important step in this context was the promulgation of the Environmental Impact Assessment Act (1990). According to this act an environmental impact assessment must take place before projects evoking major effects on environment can be authorized. Public authorities dealing with an application for a corresponding project have to consider the results of the assessment as soon as possible. The Strategic Environmental Assessment is also to be mentioned regarding specific planning decisions. Other procedural regulations are the Environmental Audit Act (2002), the Environmental Information Act, 2004 and the Environment Legal Remedies Act, 2006. The Environmental Information Act guarantees a right of free access to information concerning environment which is held by or for public authorities. Anybody may exercise this right without further authorisation. Limited exceptions are provided by law regarding public or private interests.

**7.2.4 Singapore**

Singapore is a small country in which the government exercises legislative and economic control. Exerting this legislative power, Singapore's parliament has passed various legislative acts and enacted subsidiary legislation under these acts, to safeguard the environment. In the past twenty-five years or so, parliament has enacted laws concerning inland and marine water, air, solid wastes and hazardous wastes.

The Water Pollution Control and Drainage Act 1985 (Water Act) is the primary statute that regulates inland water in Singapore. Its purpose is to provide for the drainage of inland areas, to maintain and restore the cleanliness of rivers and watercourses and to control the collection, treatment and disposal of sewage. It is divided into six parts, including parts which focus on drainage, water pollution control and sewerage. The Prevention of Pollution of the Sea Act 1990 (Sea Act) was passed to give effect to

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24 Available at: http://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1270&context=wmelpr, (visited on 16.11.2014).
the 1973 International Convention for the Prevention of Pollution from Ships as well as to make provisions to prevent the pollution of Singapore waters.

Air pollution in Singapore is controlled by Acts and regulations covering both industrial premises and motor vehicles. It includes the Clean Air Act, the Clean Air Regulations of 1972, the Road Traffic Act and the Motor Vehicles Rules of 1974. Industrial premises are regulated under the Clean Air Act. The Clean Air Act has two primary parts. Part II of the Clean Air Act regulates air pollution from highly polluting industrial premises (scheduled premises). Part III of the Clean Air Act regulates industrial and trade premises in general. The Clean Air Act adopts two standards to meet its goals: (1) reasonably practicable with regard to local conditions, circumstances and the current state of technical knowledge and (2) the best practicable means for the provision and use of plants.

The Environmental Public Health Act 1988 regulates solid waste in Singapore. Waste is defined broadly to include scrap material or an effluent or other unwanted surplus substance arising from the application of any process, any substance or article which is required to be disposed of as being broken, worn out, contaminated or otherwise spoiled, or anything which is discarded or treated as if it were waste. Solid waste is addressed in Part III of the Health Act. Part III of the Health Act deals with the cleaning of public streets, the removal of refuse, operation of disposal facilities and the disposal and treatment of industrial waste. The Commissioner has the power to set up systems for the collection and removal of refuse and other waste and he may require any person carrying on a trade or business to periodically remove industrial waste or stable refuse to a disposal facility.

Several Singapore statutes regulate toxic and hazardous waste, as well as dangerous substances. These statutes include the Environmental Public Health Act 1988, the Petroleum Act 1985, the Poisons Act 1989 and the Radiation Protection Act 199225.

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7.3 Municipal Solid Waste Management in Asian Countries

Solid Waste Management (SWM) is an integral part of the urban environment and planning of the urban infrastructure to ensure a safe and healthy human environment while considering the promotion of sustainable economic growth. Rapid economic growth by industrialization of the developing countries in Asia has created serious problems of waste disposal due to uncontrolled and unmonitored urbanization. The problem is further aggravated by the lack of financial as well human resources trained in SWM practices in the sphere of collection, transportation, processing and final disposal. In this scenario, the responsible persons or agencies concerned with the public health and environment protection face the crisis of ineffective MSWM. The waste generated in the developing countries is similar in composition, the variation between regions being dictated by the climatic, cultural and industrial, infrastructural and legal factors.

The Asian countries chosen for the comparative analysis is due to the large population in China and India with wide geographical variations while Sri Lanka and Thailand represent newly industrialized nations. All the four countries are experiencing a rapid economic growth and urbanization.

7.3.1 Solid Waste Generation

Solid waste generation in the Asian countries is based on the economic development, density of population, size of the urban habitation and consumption rate of commercial goods. The per capita generation of solid waste in Asian cities is given in Figure 7.1 which indicates a range of 0.2 to 1.7 kg’s/day. This is mainly due to economic disparity among the population especially with regard to China which has a wide range based on the economic status and population density. The urban population is over 38 percent and the waste generation has been increasing over the years\textsuperscript{26}. Similarly, the urban population of India is 28% though the figure for waste generated is based on estimates from the volume. The higher level of waste generation in Sri Lanka is due to increased consumption patterns as well as the movement of the people from the rural areas to urban centre. In Thailand over 23% of the population is urban and its rate of

economic growth causes the higher value in waste generation per capita per day. As indicated the waste generated is primarily biodegradable that is usually dumped on barren land or non-engineered landfills.

Figure 7.1
Waste generation per capita per day

7.3.2 Waste Composition and Variations

Looking at the composition of the waste generated in these countries, the bio-degradable portion dominates the bulk of MSW. Generally the bio-degradable portion is mainly due to food and yard waste, whereas the developed regions have a higher paper and cardboard content. In most of the countries composting would be the most appropriate technology for such waste reducing it almost by half. Incineration would not be a suitable option due to the extreme moisture content and accordingly a low calorific value, too low for a self sustaining incineration. The waste composition from India indicates a comparable lower food but higher inorganic (ash and dust) content.

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The lower values for paper, glass and plastic are due to the intensive collection and scavenging by informal waste collectors\textsuperscript{29}. China has also higher ash content, which is due to the geographical location in the temperate latitudes and common use of raw coal. Thailand on the other hand has an increasing trend in plastic and paper an impact of the progressing industrialization and urbanization\textsuperscript{30}.

7.3.3 Collection and Transportation

Generally speaking, waste collection service does not reach the entire population of the urban centres. On the other hand people are not aware of the facilities provided, resulting in uncollected waste, which can exceed 20 - 50\%\textsuperscript{31}. The collection ratio varies from city to city and the systems are either inadequate or inefficient. Most of the collection systems range from the use of small and impoverished metal or plastic containers or enclosures and waste platforms to well-monitored bins, which are grossly inadequate. The transport systems include a great variety of vehicles. If more efficient collection trucks are under operation the age of the fleet in general is old and their availability is low. This hampers the overall collection process and 50\% of the trucks might not be working due to lack of spare parts or continuous breakdown. Further to that collection crews increase their income by scavenging the waste thus reducing the collection efficiency. Storage bins are either in short supply or collection is not adequate to cause spilling and littering about.

7.3.4 Processing and Disposal

Proper disposal of MSW is necessary to minimize environmental health impacts and degradation of land resources. In developing countries, MSW is commonly disposed of by transporting and discharging in open dumps, which are environmentally unsafe. Systematic disposal methods are composting, land filling and incineration. Looking at the most common disposal methods in the Asian countries indicate the share of open dumping to be 90\% in India, 85\% in Sri Lanka, 65\% in Thailand and 50\% in China.

\textsuperscript{29} National Research Institute (NRI), India. Municipal Solid Waste Management in India. Country Report, (2003).


Composting

Composting is an integral part of the waste processing and disposal systems. Generally the higher biodegradable portion of MSW calls for the use of composting technique, which is being practiced in small scale. This is due to the economic strictures, lack of awareness and basic technical know-how in most urban areas. Two most common methods for the composting of waste are windrow composting and vermin culture.

In India, M/S Excel Industries Ltd has set up its “bio-organic soil en-richer” plants at Kolkata, Bangalore and other places with capacities of 35 to 500 tons per day. It has a distinct “build-own-operate” basis for its plants in coordination with the local or state agencies enabling an efficient running system. The Celrich compost generated is marketed through Excel’s network for its own agro-chemicals throughout India thus effectively reducing the use of chemical fertilizers by the farmers for growing sugarcane, grapes and bananas. The overall cost of production per ton is US$ 25 to 30 while the market value is US$ 33.5 to 42 per ton. Excel is planning to setup more composting plants for municipal and agro industrial wastes. It has also provided its technical cooperation to its counterparts in Sri Lanka for windrow composting under Colombo Municipal Council. Following the example set by Excel, other private entrepreneurs and NGOs have taken up bio-waste composting ventures in other parts of India. Though manual composting was practiced in many places in India, technical problems due to the lack of space and bio-waste segregation has discouraged the use.

In Thailand, 10% of the MSW is composted and one of the methods applied is the vermin composting using tiger worms to reduce the biodegradable in Barommatrilokanat 21 community. Domestic refuse is separated at source into organic matter, recyclables and general garbage. The organic matter is collected and brought to the community composting centre made of circular cement and/or brick enclosures where tiger worms are used to convert the bio-waste. It takes about 3 to 4 months for one batch to decompose into compost rich in humus, which is used to improve the soil porosity in

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clayey soil. The compost provides additional incomes to the community as it can be sold for US$ 125 per ton\textsuperscript{33}.

\textbf{Land filling}

The final disposal of MSW is landfill occurs at three categories, which are:

1. Open dump or open landfill, which is the most common for all developing countries whereby the refuse is simply dumped in low lying areas on open land and the waste, is tipped haphazardly.

2. Semi-controlled or operated landfills are those in which at a designated site, the dumped refuse is compacted and daily topsoil cover is provided to prevent nuisance. Every kind of waste municipal, industrial or clinical/hospital waste is dumped without segregation and is not engineered to manage the leachate discharge and emissions of landfill gases.

3. Sanitary landfills are those practiced in the developed countries with facilities for the interception of the leachate generation and its treatment using a series of ponds and it has arrangements for the control of gases from waste decomposition\textsuperscript{34}.

Among the three, sanitary land filling is an engineered system which is the best option taking into account the likely environmental impacts by the MSW with respect to the pollution of air, water and soil. However, this kind of comparable secure system is scarcely found in the region.

\textbf{Incineration}

Incineration of the solid takes a low profile in the waste disposal system practiced in the Asian countries, which is similar in most developing countries. The main constraints are the high capital, operation and maintenance costs involved. The major portion of the MSW is bio-degradable with relatively high moisture content; the calorific value (CV) of the waste is low. It is found that the technology is unsuitable unless the bio-wastes are separated at the source and the calorific value is suitable for the purpose. In specific cases like the clinical and hospital wastes incineration has to be applied which for example is widely used in facilities in Thailand.


Developments Abroad

The Philippines Clean Air Act 1999 bans the incineration of wastes. In 1985, Sweden implemented a two year moratorium on the construction of all new incinerators. The US EPA has released a set of new operating parameters that will have the effect of shutting down 70% of the incinerators. Since 1985 about 280 incinerator proposals in the US have been refused or abandoned due to public opposition.

The Japanese government has announced that it will not allow new garbage incinerators to be built in areas where dioxin concentrations exceed the prescribed limit. However, the government has not imposed restrictions on small size incinerators which burn waste at a rate less than 200 kg’s per hour. Australia has no national hazardous waste incinerator or any other incinerator that is licensed to burn hazardous waste.\(^5\)

**Figure 7.2**

MSW disposal methods practiced in Asian countries\(^6\)


7.4 Electrical and Electronic Waste Management in India and Switzerland

Due to rapid growth in usage of Electric and Electronic Equipment (EEE) in modern life style, e-waste management is a growing and global issue. The major problem lies with the populous and developing countries like China and India, which have although small per capita waste production (estimated to be about 1 kg per capita per year), but are huge producers of Waste Electrical and Electronic Equipment (WEEE) and also have the fastest growing markets for EEE which is far from saturation\(^{37}\). In addition, a considerable amount of used EEE has been imported both legally and illegally in these countries. The large-scale unethical export of e-waste by industrialized nations to developing countries such as India, China and Pakistan has shifted the adverse consequences of development to communities, which are ill equipped to deal with such wastes\(^ {38}\).

Switzerland and India are two different countries in their handling of post consumer electronic and electrical waste. The key issues discussed in each country also varied widely. The biggest advantage of comparing Switzerland to India is to find how a system that has been in place for some time evolved and how that may help India (or a similar developing country) in establishing its own e-waste management systems. It is improper to even suggest that since the Swiss system has been found to be successful, it should be replicated, ad verbatim. Instead, a comparison is used to identify and benefit from, the strengths and weaknesses of both systems. The major comparison indicators are actor involvement, material flows and controls and externalities. The indicators were chosen on their ability to illustrate the most important characteristics of an e-waste management system.

7.4.1 Actor Involvement

Actor involvement indicates the level of involvement of each actor – the government, the producers, the retailers, the consumers, the collectors and recyclers.


A high involvement of all actors represents equitable distribution of the responsibility of managing e-waste. The actors can bear financial, legal, informational, physical or controlling responsibilities which directly influence the e-waste management system.

The Swiss system entails a high degree of involvement for all actors, who share the responsibility of the product equitably. The consumer pays the advance recycling fee (ARF) and must bring back the product, the retailer is obligated to take it back, the recycler must ensure that the e-waste is properly recycled and the producers, bear their share of the responsibility by ensuring that the environmental impact of their products are minimal through its entire life cycle. The government does not participate in the system on a day-to-day basis, but performs a controlling and monitoring role and sets guidelines, as and when required. In India, the government and producer are not involved in the e-waste management system in any way. The highest involvement is that of collectors and recyclers who bear the physical and economic burden of the end-of-life management of the appliances\textsuperscript{39}.

7.4.2 Material Flows and Controls

In Switzerland, approximately 9 kg’s/capita of e-waste are processed every year, among the highest in the world. In India the per capita generation of e-waste was substantially lower. This is also a result of the low market penetration of electronic and electrical equipment. However, both India and Switzerland has similar characteristics when it comes to the variety of the e-waste processed. Both systems encompass all (or most) types of discarded electronic and electrical appliances. Between the Swiss Economic Association for the Suppliers of Information, Communication and Organizational Technology (SWICO) and the Swiss Foundation for Waste Management (SENS) systems in Switzerland, all types of equipment from IT and office to consumer electronics to small and large household appliances are covered. In India, though no such formal demarcation of responsibilities exists, collectors and recyclers process any kind of equipment that has electronic or electrical components. Both systems also do not discriminate on the basis of product brand, accepting any equipment from all manufacturers, irrespective

of when or where the product was sold. The main difference in the two systems is in terms of the controls and monitoring mechanism. In Switzerland the multiple levels of controls through the entire system is there, while in India complete control over the flow of material is lacking.

### 7.4.3 Externalities

The external effects of an e-waste management system can be both positive as well as negative. While positive effects include job creation and the economic multiplier effects there from, the negative side effects could mean higher levels of pollution and dangers to human health. In a system, the negative externalities should be minimized while attempting to maximize positive externalities. Externalities exist in both systems, both positive as well as negative. On the positive side, the Swiss system, with high emission standards is able to have lesser soil, water and air pollution. Not only are the standards higher, the actors fulfilling these requirements as well. The Swiss system also enforces high occupational health standards for people involved in the handling and treatment of e-waste. In contrast, the most positive aspect about the Indian system is the large number of jobs it generates, giving employment to many more people than in Switzerland. However, the low emission and occupational health standards are the negative aspects of the Indian system which need to be improved.

### 7.4.4 Environmental governance

India and Switzerland are radically different in their environmental governance. Environmental regulations in Switzerland are not only much more stringent but also better enforced. Relatively, in India, the implementation and enforcement of environmental regulations is lax and even in case provisions for penalties exist, they are seldom applied. As a result, there is little deterrence (and conversely little incentive) for actors engaging in polluting activities (conversely, environmentally friendly activities). Without any strict guidelines making either actor – manufacturer, retailer, consumer or recycler – responsible for the sound management of e-waste, the current system has evolved purely based on market needs, by shifting costs out of the system as far as possible. The Swiss system, in comparison, internalizes most of the environmental costs, in large part due to the legal mandate with clearly defined responsibilities and their strict enforcement in cases of
non compliance. The differences between India and Switzerland on indicators such as control and monitoring over the material flows and emission and occupational health standards could also be attributed to the different levels of environmental governance between the two countries.

7.5 Bio-Medical Waste Management in Asian and African Countries

The hospital waste management practices in a few Asian countries have been chosen, viz. Japan, People's Republic of China and several of the South Asian countries, since they are neighbours to the Indian sub-continent. As for the south Asian countries, a comparative analysis has been drawn and the Indian legal scene has been included in the comparison.

In Japan, the infectious waste management was first regulated in 1992 rule and infectious wastes are defined as the waste materials generated in medical institutions as a result of medical care or research which contain pathogens that have the potential to transmit infectious diseases. Revised criteria for infectious waste management were promulgated by the Ministry of Environment in the year 2004. Infectious waste materials are divided into three categories: the form of waste; the place of animal generation; the kind of infectious diseases.

In The Peoples Republic of China, sustainable management of healthcare wastes (HCW) takes into account the requirements deriving from the Stockholm Convention on Persistent Organic Pollutants (POPs) and the WHO recommendations. Although there were two laws on the subject, this is the principal law on Environmental Protection in China. The other law is a special law for prevention, control and elimination of infectious disease and protection of human health, viz. Law of the People's Republic of China on Prevention and Treatment of Infectious Diseases, 1989; and although there have been various standards laid down in the year 2001, it was only after a few years that special administrative regulation for Chinese healthcare waste management was introduced called the Healthcare Waste Management Regulation, 2003.

One important basis of this management process, stimulated five categories of healthcare waste as infectious waste, pathological waste, sharp objects, chemical waste and pharmaceutical waste and this was recognized through another regulation called
Medical Waste Category 2003 which was soon thereafter followed by stipulated administrative punishment for violations of Healthcare Waste management provision called the Administrative Punishment Rules for Medical Waste management in the year 2004.

As far as the South Asian countries are concerned, legislative measures in respect of management of bio-medical wastes in select countries, viz. in Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka were analysed. It is seen that apart from India (which has a specific set of rules from the year 1998) and Pakistan (which has rules for hospital waste management from the year 2005) other South Asian countries do not have any specific legal control over the management and handling of bio-medical wastes, even though there are legislative measures for the protection of the environment.

In South Africa, effective regulations have been identified in Guateng - the smallest province in the Republic with only 1.4% of the land area, but highly urbanised, which comprised of the cities of Johannesburg and Pretoria\(^\text{40}\).

The province of Guateng has Healthcare Waste Management Regulations, 2003, which apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle healthcare risk waste in any form in the Province of Gauteng. It defines 'healthcare waste generator' means any person, whose acts or processes produce healthcare waste and includes, but is not limited to, home based care givers and organizations; medical and dental practitioners, clinics, hospitals, surgery centres, laboratories, research laboratories and general practitioners; veterinary practitioners, clinics and hospitals; traditional healers; and tattoo artists; body pierces, undertakers and embalmers.

The regulation lays down a general prohibition and duty of care, focuses on segregation, waste minimization, packaging, internal transport, treatment and disposal of healthcare waste. Other issues of concern in these regulations are authorization to generators of healthcare waste, reporting, record keeping and audit reports. Some of these provisions are similar to the Indian legal provisions.

\(^{40}\) Available at: http://www.elaw.org/node/2852 (visited on 8.2.2014).
7.6 Hazardous Wastes Management in Developed and Developing Countries

Hazardous waste management programs in developing countries follow the same five major stages of development as in developed countries: problem identification and legislation; selection of a lead agency, promulgation of rules and regulations; development of treatment and disposal capacity; and creation of a mature compliance and enforcement program. However, most developing countries are still many years away from a mature hazardous waste management program.

As is the case in developed countries, industry is a major source of hazardous waste in less developed countries, but industrial hazardous waste sources in developing countries present more risks than in developed countries because of poor management and obsolete technologies. Notably, multinational companies often shift their plants to less developed countries and use technology banned in their home countries. The accident at the Bhopal plant in India, which belonged to Union Carbide of USA, is a prime example of this situation. A number of hazardous waste sources are specific to less developed countries. Transporters and disposal facilities for hazardous waste, for example, create greater hazards in developing countries due to less strict management standards.

Another unique problem to developing countries is that hazardous wastes or wastes contaminated with hazardous wastes are often reclaimed and recycled by scavengers. Household sprays and insect repellents, which are in widespread use in hot climates, can also present higher risks in developing countries. Contaminated sites, spills and abandoned industries are often never remediated or restored to their original conditions, as is the case in Tanzania, so they continue to be sources of pollution to groundwater and soil through leachate, to air by volatilization and to surface water by surface run-off.

Developing countries possess a mix of industrial and less developed country-specific hazardous waste sources. The major sources of hazardous solid wastes in Tanzania, for example, are industrial activities, agriculture and agro-industry, medical facilities, commercial centres, households and the informal sector. The informal sector, the part of the urban economy in less developed countries that has small, competitive and labour
intensive businesses that are not regulated by the government, is a unique source of hazardous solid waste that is currently recognized as a major problem in many developing countries.

Problems involving mismanagement of hazardous agrochemicals in particular are more serious in developing countries, especially in Africa and Latin America, than in the developed world. Agro-industry encompasses farming activities (including urban agriculture), livestock production (including processes that are pertinent to the processing of livestock products) and agro-produce processing activities. Common wastes from these sources include crop residues, grain bran and animal carcasses. These waste fractions are generally re-used and recycled at a high rate as soil amendment agents in addition to being reused as animal feed or as raw materials for animal feed production. The hazardous agro-industry waste fractions include pesticides, industrial fertilizers, veterinary products and animal carcasses. These components are of concern because of their health and environmental impacts and the fact that they are not properly managed. Notably, in Tanzania many stocks of obsolete and unwanted pesticides as well as veterinary products are poorly managed. Both fertilizers and pesticides find their way into ground and surface water sources with resultant impacts.

Although there are hazardous waste management difficulties everywhere due to their health and safety risks, less developed countries face a unique set of additional problems. Many hazardous substances are produced by technologies from the developed world, so less developed countries certainly face some of the same problems experienced by developed countries. Compared to economically developed countries, however, developing nations do not possess the advanced technology necessary for adequate hazardous waste management. Severe financial constraints often prevent these countries from acquiring the necessary technologies and many are dependent upon donors for technology acquisition. This is exacerbated by the fact that a variety of other problems resulting from economic difficulties make hazardous waste management a low priority compared to other more immediate concerns. In addition to economic constraints, hazardous waste management deficiencies in developing countries are also a result of the general lack of awareness among citizens. In Tanzania, for example, as well as many other developing countries, hazardous waste management has not received sufficient public attention.
Many less developed countries suffer from waste dumping and mismanagement because they lack legislative provisions or enforcement mechanisms necessary for proper hazardous waste management. The current trend of economic liberalization can exacerbate such a situation by resulting in the increase of the types and quantity of hazardous wastes. Economic liberalization can also lead to the growth of industries and other economic establishments that produce hazardous wastes in areas that were previously reserved for other uses, for example in residential areas or near water sources. High population growth accompanied by economic development has also caused a massive increase in the production of solid waste, including hazardous wastes. When coupled with the hazardous waste problems already faced by less developed countries, including safety and health issues, ignorance, legislative deficiencies, enforcement laxity, technological deficiencies and poverty, it is no wonder that this has triggered discussions aimed to avert the potential public health and environmental catastrophe that could occur as a result of the additional waste production.

To address their unique hazardous waste difficulties, developing countries should learn from the experiences of developed nations while also looking for new and innovative solutions that achieve a better fit with the limited resources available to developing nations. Despite the numerous hazardous waste problems faced by developing countries, it is promising that concern for hazardous waste management is becoming a growing issue among less developed countries.

7.7 Conclusion

This chapter has brought out a comparative account of the environmental protection and hazardous, solid waste management laws in respect of India, UK, USA, Germany, Singapore and other developed and developing nations. Matters related to the enforcement of the environmental laws and the judicial response also find place in this study. The Indian Supreme Court in the case of Indian Council for Enviro-legal Action v. Union of India41 has held that the plethora of the environmental legislation in India has not resulted in preventing environmental degradation, which on the contrary has increased over the years.

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41 (1996) 3 SCC 212.
Britain has taken a lead in European environmental law by enacting the Environmental (Protection) Acts 1990/1995, which transposes many EC Directives into national law and also by restructuring the environmental enforcement agencies responsible for pollution prevention.

The Municipal Solid Waste (MSW) composition in Asian countries is broadly similar differing slightly due to climatic and cultural variations. The system adopted for collection, transportation and disposal is also similar but unique to Asia, unlike in the developed countries where the MSWM is formalized. This uniqueness is attributed to the waste composition, involvement of the informal sector, voluntary groups, private organizations, NGOs and Community Based Organizations (CBOs) and rapid privatization of collection, transportation and processing systems. Composting is seen as a major processing system for almost one half of the waste which is bio-degradable and can be enhanced with economically friendly source separation techniques like in the developed countries. The recent trends in technological development for Municipal Solid Waste Management (MSWM) systems in Asia cannot be effective by direct transfer of technology from the west without adapting it to suit the situation in Asia. The major lacuna in the allocation of resources for the MSWM in Asia which does not encompass the entire SWM scenario requires immediate attention of the Government and Civic Organizations to curtail the growing environmental problems. The present scenario of MSWM which is undergoing rapid changes towards the incorporation of the Integrated Solid Waste Management (ISWM) could pave way for sustainable urban environment in Asia with effective inputs in economic, environmental and social aspects with adequate institutional arrangements.

The comparative study of the management of e-waste in countries like India and Switzerland shows that they have entirely different systems. While the circumstances may be different in different situations and not replicable, there are learning from the systems that are applicable universally. Firstly, there should be a systematic collection of e-waste, which can be private or public, organised or semi-formal. Whatever the nature of the collection system, it should be comprehensive including all types of electronic and electrical wastes. A system with only partial coverage of product categories, or based on
the time of sale, or one that singles out specific brands, is not convenient from a consumer’s point of view. The success of the Swiss system shows that competitors can co-operate to have an efficient and flexible e-waste management system.

The bio-medical waste management was earlier controlled through laws governing general waste management in almost all countries, till such time specific law was enacted for this purpose. The legal framework in the USA is the starting point in the enactment of specific law for this purpose, following which several countries of the world took initiatives in this direction. This study has highlighted the legal framework in the, South Africa, Asian and South Asian countries. Apart from the USA, few countries have specific laws to manage bio-medical wastes, notable amongst them being the Guateng Province in South Africa and India being the first amongst the South Asian countries to have a law that is specific for the managing and handling of bio-medical waste.