



Guidance on conducting Environment Audit

8th ASOSAI Research Project

India, China, Malaysia, Pakistan and Saudi Arabia

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Foreword

The 8th ASOSAI Research Project on '*Environmental Audit Guidelines*' was approved in the 37th Meeting of the Governing Board of ASOSAI held at Shanghai, China on 15th September 2006. The objective of the project was to provide specific guidance to ASOSAI member nations in conducting environment audit, which is an emerging area of audit enquiry. Five member nations opted to be the members of the research project, namely India, China, Malaysia, Pakistan and Saudi Arabia. As the regulations governing the environment and audit of the environment were different in different ASOSAI nations, the project members were of the view that a research project on '*Guidance on conducting environment audit*' would be a more appropriate topic than '*Environmental Audit Guidelines*'. This change was approved in the 38th Meeting of the Governing Board of ASOSAI held in Kuwait in September 2007.

The '*Guidance on conducting environment audit*' includes themes of environment audit like waste management, air pollution, water pollution and biodiversity. As audit of water management has a very vast coverage, the scope of this guidance has been limited to audit of water pollution issues. Even though references have been made to financial audit in the chapter on audit processes, financial audit of environment issues has been kept out of the scope of this guidance.

The members of the research project recognized the fact that the INTOSAI '*Working Group on Environmental Auditing*' had already issued many broad guidelines on various environment audit related topics over the last decade. However, this research project aimed at guiding the ASOSAI member nations in initiating and facilitating the conduct of compliance and performance audits of the environment in a more detailed manner, keeping in view the fact that most ASOSAI member nations are at a nascent stage with regard to audit of the environment. This guidance aims to flag very basic issues for audit enquiry that auditors need to examine before drawing their audit conclusions. To achieve this end, the guidance has included detailed checklists of issues to be seen while conducting both performance and compliance audit in the areas of waste management, air pollution, water pollution and biodiversity. The guidance also includes a database consisting of a gist of environment audits already conducted by some ASOSAI members which highlight a host of critical and topical environmental issues being faced specifically in the ASOSAI region.

The team members of the research project consisted of Chen Jixiang from SAI China, Raj G Viswanathan and Nameeta Prasad from SAI India, Oi Chu Kim Ting from SAI Malaysia, Nasira Praveen Khan and Munnaza Aisha (present only in the last meeting in Riyadh) from SAI Pakistan and Salem Ali Al Qhtani from SAI Saudi Arabia. The research group held five meetings over a span of 22 months and the final exposure draft on the '*Guidance on conducting Environment Audit*' was finalized for circulation amongst all ASOSAI Governing Board members in June 2009.

The research team would like to express its gratitude to the SAIs of China, India, Malaysia, Pakistan and Saudi Arabia for hosting the meetings for the research project and providing necessary infrastructure. The research team would also like to express its special gratitude to the Governing Board of ASOSAI, for having chosen this subject and fully supporting the project.

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Guidance on conducting Environment Audit

Chapter I

Introduction

About environment

1.1 Environment is a complex of physical, chemical and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival. It is the combination of different external physical conditions that affect and influence the growth, development and survival of organisms. Such external conditions include biotic components like plants, animal and other living beings and abiotic components like soil, weather, water, sunlight etc.

Environmental degradation

1.2 The relentless march towards development, industrialization and increasing urbanization has led to degradation of the environment. Environmental degradation occurs when nature's resources such as trees, habitat, earth, water and air are consumed faster than nature can replenish them, when pollution results in irreparable damage to the environment or when human beings destroy or damage ecosystems in the process of development. Environmental degradation can take many forms including, but not limited to, desertification, deforestation, extinction and radioactivity. Some of the major causes of such degradation include overpopulation, urban sprawl, industrial pollution, waste dumping, intensive farming, over-fishing, industrialization, introduction of invasive species and a lack of environmental regulations. Theoretically, the long-term result of environmental degradation would result in local environments that are no longer able to sustain human populations to any degree. Such degradation on a global scale, if not addressed, would mean extinction for humanity.

Impact of environmental degradation

1.3 Environmental degradation all over the world has led to a very grim picture of the state of natural resources today. Increase in water pollution, atmospheric pollution, pollution of coastal areas, decrease in size of forests, increase in emissions of greenhouse gases, over-exploitation of land, dumping of waste matter and increase in pollutants have contributed to the threats faced by biodiversity and ecology of the earth. The impact of environmental degradation on water, land, forests, biodiversity, climate, atmosphere and marine/coastal areas is discussed below:

- **Water:** Agriculture and allied activities account for more than 70 per cent of freshwater usage. By the mid-1990s, 40 per cent of the world population was suffering from serious water shortages. By 2025, two-thirds of the world's population may be living in countries

that face serious water shortages.

- **Land use:** Overgrazing has led to damage of 20 per cent to 35 per cent of pastures, grasslands and de-flooding of farmland during monsoon. This causes soil erosion, estimated at 25 billion tonnes per annum. More than 250 million people are directly affected by desertification. Extraction of crops, bio-matter etc., each year exceeds what nature can restore and the estimated deficit is 20 per cent.
- **Forests:** More than 220 million hectares of tropical forests were destroyed during 1975-90, mainly for production of food. The annual rate of natural forest loss is estimated at over 14.6 million hectares (an area of the size of the country of Nepal) and deforestation of tropical forests is almost 1 per cent annually.
- **Biodiversity:** More than 11,000 species of animals and plants are known to be threatened with extinction. The current species extinction rate is estimated to be 1,000 to 10,000 times higher than the natural rate.
- **Climate change:** Our planet is warming faster than at any time in the past 10,000 years. This greenhouse effect¹ is driven by gases like carbon dioxide (CO₂), which have reached their highest level in more than 400,000 years. The concentration of carbon dioxide in atmosphere has increased by 31 per cent since 1750. The current rate of increase is unprecedented during at least the past 20,000 years.
- **Atmosphere:** Indoor and outdoor pollution is estimated to cause 5 per cent of the global burden of diseases. In developing countries, 500,000 people die annually from outdoor pollution and 1.9 million from indoor pollution. Around 30 to 40 per cent of the cases of asthma and 20 to 30 per cent of all respiratory diseases may be linked to air pollution. The ozone 'hole' reached a record size in September 2000 (28.3 million km²) and was three times the size of United States of America.
- **Waste:** Fewer than 35 per cent of the cities in developing world have their wastewater treated. Between 33 to 50 per cent of solid wastes generated in low and middle income countries are not collected and are left to flow into rivers and seas; thus causing immense pollution. Lack of access to safe water supply and sanitation results in millions of cases of water-related diseases and more than 5 million deaths every year.
- **Marine and coastal areas:** About a third of all coral reefs are expected to vanish in the next 30 years. Over 700 million gallons of oil end up in the seas every year. The biggest source of pollution is

¹ The greenhouse effect is the heating of the surface of the earth due to the presence of an atmosphere containing gases that absorb and emit infrared radiations.

non-accidental, from leakages and discharge from refineries.

Sustainable development

1.4 The global environment scenario is very grim because of increasing water and atmospheric pollution, over-exploitation of land, cutting down of forests, increase in untreated waste, threats to biodiversity and coastal/marine areas. Over the years, the concept of sustainable development has evolved which means development that 'meets the needs of the present without compromising the ability of future generations to meet their own needs'. Sustainable development recognizes the need for a balance or trade-off between economics, social progress and environment. Sustainable development does not focus solely on environmental issues. More broadly, sustainable development policies encompass three general policy areas, i.e., economic, environmental and social. In support of this, several United Nations texts, most recently, the 2005 World Summit Outcome Document, refer to the 'interdependent and mutually reinforcing pillars' of sustainable development as economic development, social development and environmental protection.

Public management of the Environment

1.5 The role of public management in the field of environment management extends to protection of the environment, prevention of activities which would harm the environment and introduction of activities which would eliminate the adverse effects of environmental pollution. In order to fulfil its role in environmental management, the following specific activities need to be undertaken:

- Framing National environment policies, legislations and regulations
- Setting environmental norms and standards
- Enforcement, licensing, inspection and penalties for violation
- Introduction of specific programmes for environment protection and its implementation, oversight and monitoring

Different institutional arrangements are prevalent in different countries to undertake these activities. While, in some countries, the responsibilities for framing of policies, setting of norms/standards and enforcement is entrusted to one agency, in other countries these responsibilities are handled by different specialised agencies. The implementation of the environment programmes are usually entrusted to various field agencies which may also include state/local governments, civil society organisations etc, .

The multiplicity of agencies involved, pressures of various interest groups and complexity of the tasks to be performed in

environmental protection poses a great challenge to the public management in ensuring adequate protection of the environment.

Environment Audit

1.6 According to World Bank, environment audit is a methodical examination of environmental information about an organization, a facility or a site, to verify whether, or to what extent, they conform to specified audit criteria. The criteria may be based on local, national or global environmental standards. Thus, it is a systematic process of obtaining and evaluating information about environmental aspects. The International Organisation of Supreme Audit Institutions (INTOSAI) framework definition of environment auditing is:

- Environment auditing is not significantly different from normal auditing as practiced by Supreme Audit Institutions (SAIs).
- Environment auditing can encompass all types of audit, i.e., financial, compliance and performance audits. With respect to performance audits, the three E's of Economy, Effectiveness, and Efficiency can be included. The adoption of the fourth E, that is 'Environment', depends on the SAI's mandate and its government's environmental policy, which is desirable but not critical, in carrying out environment audit.
- The concept of sustainable development can be a part of the definition of environment audit, only if it is a part of the government policy and/or program to be audited.

Obstacles facing Environment Audit

1.7 Audit of the environment usually evokes negative responses from the auditees as the capability and knowledge of the auditor in this specialized area is often challenged. Further, solutions to environmental problems are more empirical and not backed by consensus amongst experts. This poses a problem for the auditors in arriving at definite conclusions and in suggesting recommendations. Another problem faced by auditors is the fact that environmental issues involve multiple agencies and there is difficulty in identifying bodies which take ownership of critical environmental concerns.

These obstacles faced by auditors can be addressed by involvement of concerned stakeholders in all stages of the audit process, equipping auditors with better knowledge/skills and sharing of experiences with other SAIs through regular interaction.

Chapter II Audit Process

Stages in the audit process 2.1 Although every audit project is unique, the audit process is similar for most audit engagements like for compliance, performance or financial audit and normally consists of four stages:

- **Planning for the audit.**
- **Conducting field audit.**
- **Audit reporting.**
- **Follow up review.**

During planning stage of the audit, background information about the entity is collected, scope of audit is set, audit objectives and broad audit criteria are decided and audit methodology is determined. During the conduct of field audit, auditors conduct an opening meeting with the audit entity, collect sufficient, competent and reliable audit evidence and have a closing meeting with the entity. During the post audit stage, the report is drafted by the audit team and approved by the senior management. A formal exit conference is held with the audited entity to discuss the findings in the audit report. If it is a performance audit report, recommendations suggested by the auditors are also discussed with the management. The audited entity's views are elicited and the final report is drawn up, after incorporating the replies received from them. The final report is sent to the senior management of the audited entity with the recommendations. The last stage is the follow up review wherein, after approximately a year or so, audit verifies the action taken on the audit findings, conclusions and recommendations, if any.

Audit planning 2.2 Audit planning is vital to the success of the audit undertaken. It is essential that the auditors spend adequate time in planning, as this will result in better identification of priority areas and potential problems and proper assignment of work.

For planning for successful audit assignments, the auditor needs to understand the auditees' commitments in terms of financial norms, compliance requirements and performance expectations. This would determine what procedure is to be followed (audit methodology) and assignment of qualified staff for the conduct of audit (resource allocation).

- Gathering background information for environment audit**
- 2.3** Some of the sources available for gathering background information about the audit entity for compliance, financial and performance related environment audits are:
- Environmental policy of the audit entity.
 - Financial policies relating to the environment governing the audit entity.
 - Relevant rules and regulations governing the audit entity which relate to environmental compliance.
 - Annual report of the audit entity.
 - Administrative and financial delegation of powers of the audit entity.
 - Reports of the Internal Audit of the audit entity.
 - Commitments given by the audit entity to the government planning agencies, in performance/outcome budgets.
 - Media reports.
 - Reports of independent evaluation agencies like Non Government Agencies (NGOs).
 - Peer review reports.
- Setting audit scope for environment audits**
- 2.4** Audit scope will differ for different kinds of audit, as discussed below:
- (a) Compliance audit:** The scope of audit is restricted to checking compliance of the audit entity with respect to policies/laws/rules/regulations which are specific to each Asian Organisation of Supreme Audit Institutions (ASOSAI) member nation.
- (b) Performance audit:** The scope could encompass the following:
- **Audit of Government’s monitoring of compliance with environmental laws:** The main aim of such audit is to offer an opinion on the performance of the audit entity with regard to compliance against already established environmental laws.
 - **Audit of the performance of Government’s environmental programs:** The main aim of such audit is to offer an opinion on the performance of specific environmental programs/projects/strategies already formulated and being implemented by the Government.
 - **Audit of the environmental impact of other Government programs:** The main aim of such audit is to offer an opinion on the environmental impact of other programs/projects formulated and implemented by other Ministries/

departments/agencies other than the Ministry/Department of Environment. For example, audit of the impact of mining, building roads/dams, military operations etc., on the environment would fall under this category.

- **Audit of Environmental Management Systems:** The main aim of such audit is to offer an opinion on the implementation of Environmental Management Systems (EMS) of the audit entity and/or ISO 14001 Standards². The absence of an EMS can also be a source of audit comments.
- **Evaluation of environmental policies and programs:** The main aim of such audit is to offer an opinion on the adequacy or lack of a policy framework governing environmental issues. International best practices can be a source for such comparison. However, adaptability to local conditions should be considered before making such comparisons.

(c) **Financial audit:** Some audit entities operate in sectors where environmental matters may have material impact on their financial statements. In such entities, impact of environment related issues requires to be adequately reported upon in the financial statements. The International Auditing Practices Committee (IPAC) defines environmental matters in a financial audit as:

- **Initiatives to prevent/abate/remedy damage to the environment or to deal with the conservation of renewable and non-renewable resources.** Such initiatives may be required by environmental laws and regulations or by contract, or they may be undertaken voluntarily.
- **Consequences of violating environmental laws and regulations.**
- **Consequences of environmental damage done to others or natural resources.**
- **Consequences of vicarious liability³ imposed by law.** An example could be the present owners being held liable for environmental damage caused by the previous owners.

Based on these considerations, an audit opinion can be expressed on adequacy of compliance to the various national and adopted international financial regulations.

Setting audit objectives for environment 2.5 The need for setting objectives for an audit assignment depends on whether the focus of audit is financial, compliance or performance.

² International Standards Organisation has set specific guidelines for implementing EMS in organizations.

³ When one person is liable for the negligent actions of another person, even though the first person was not directly responsible for the damage.

audits

(a) Compliance audit: For compliance audit, focus areas for audit can be identified stemming from applicable governmental rules and regulations. Accordingly, specific objectives may be set for compliance testing.

(b) Performance audit: For performance audits, audit objectives need to be identified at the very beginning and can relate to areas like:

- Existence and adequacy of environment policies / laws /strategies.
- Adequacy of data for evaluating impact on pollution on environment.
- Identifications of risks caused by pollution to health and environment.
- Allocation of responsibility amongst the various stakeholders involved in pollution control.
- Adequacy of monitoring and evaluation of environment laws.
- Adequacy of infrastructure and funding.

(c) Financial audit: For financial audit, the objectives for financial checks are derived from the environmental financial standards applicable to the entity.

Setting audit criteria for environment audits

2.6 Audit criteria help in assessing the performance of the entity with reference to certain laid down standards and performance benchmarks. Compliance, financial or performance auditing requires assessment on the basis of criteria. If the criteria are inappropriate and inapplicable based on biases, the SAI can be faced with certain risks in undertaking environment audit. In order to evade this, an auditor may take the auditee’s opinion on the audit criteria before starting. At the same time, these criteria should be specific, measurable, reliable, acceptable, timely and coherent. The different criteria that can be considered for use in compliance audit, performance audit and financial audit are discussed below.

(a) Compliance audit: The purpose of the criteria for an environmental compliance audit is to enable the auditor to establish whether the entity has conducted an activity, which has an impact on the environment, in compliance with all applicable obligations. Sources of criteria could include:

- National laws – Acts of the legislature and any regulations, rules, orders etc., made under an Act and having the force of

law.

- Supranational laws – such as legislation enacted by SAARC⁴, ASEAN⁵, European Union etc.
- International agreements – such as treaties with other jurisdictions and United Nations Conventions.
- Binding standards (including techniques, procedures, and qualitative criteria) issued by environmental monitoring/regulatory agencies.
- Contracts.

(b) Performance audit: The purpose of the criteria for an environmental performance audit is to enable the auditor to form an opinion on whether the entity has conducted the environmental activity in an effective, efficient and economical manner consistent with the applicable governmental policy. Sources of criteria could include:

- Performance indicators of effectiveness, efficiency and/or economy that are prescribed by law, specified in the official governmental policy for the activity or otherwise mandatory on the entity.
- Generally accepted standards issued by a recognised body.
- Codes of professional practice issued by a recognised body.
- Performance indicators or measures used by similar entities or other entities engaged in similar activities.
- Academic literature.
- Outside experts.

(c) Financial audit: The purpose of criteria for the environmental aspects of a financial audit is to enable the auditor to establish whether the reporting entity has appropriately recognised, valued and reported environmental costs, liabilities (including contingent liabilities) and assets. Sources of criteria could include:

- Mandatory standards issued by authoritative standard-setting bodies.
- Standards issued by some other recognised bodies.
- International standards issued by recognised bodies.
- Guidance issued by relevant professional bodies.
- Academic literature.

⁴ South Asian Association for Regional Cooperation.

⁵ Association of South East Asian Nations.

Audit methodology for conducting environment audit 2.7 Audit methodology guides the conduct of financial, compliance and performance audit in the field and would include:

- **Compiling checklists:** Major audit issues, in line with audit objectives need to be put in the form of checklists, which will be given to the audit party for ensuring that conclusions against the various audit objectives could be arrived at.
- **Sampling:** Various sampling techniques like random sampling, stratified random sampling, judgmental sampling, purposive sampling etc., could be used in the audit process.
- **Deciding audit program:** This could include identifying the number of man-days, personnel, allocation of responsibilities and, finally, the detailed audit plan.

Conducting field audits 2.8 The purpose of fieldwork is to accumulate sufficient, competent, relevant and useful evidence to reach audit conclusions in compliance, performance and financial audits. Audit evidence is sufficient when it is factual and would convince an informed person to reach the same conclusion. Evidence is competent if it consistently produces the same outcome. It is relevant when it is directly related to the audit comments, recommendations and conclusions.

Conducting field audit consists of the following steps:

- **Conducting an opening meeting with the audit entity in order to explain audit objectives, criteria and methodology to be followed by audit.**
- **Collecting audit evidence through questionnaires, interviews, document scrutiny, photographs, direct testing of samples collected by audit etc.**
- **Conducting a closing meeting with the audit entity in order to share the preliminary audit findings.**

Post audit 2.9 The audit report communicates the results of the audit work and is thus, one of the most important parts of the audit process. If written and communicated well, the report can act as a positive change agent prompting management to take corrective action. The steps taken during post audit in compliance, performance and financial audit are:

- **Preparing a draft report after analyzing the audit evidence and drawing audit conclusions.**
- **Conducting an exit conference with the audit entity to discuss**

the draft report.

- Eliciting audit entity's responses to the draft report.
- Preparing final report after taking into account the audit entity's responses to audit conclusions and suggesting recommendations.

Follow-up review 2.10 Follow-up review for financial audits is usually governed by the periodicity as applicable in the financial rules and regulations valid in the country. As regards follow-up review for compliance and performance audits, such reviews may be carried out to verify the resolution of the report findings within a reasonable time frame as decided by the SAI. Audit recommendations require prompt resolution and implementation of corrective action so that benefits can be realized. Auditors should have a process that enables them to track the status of management's actions on significant findings and recommendations.

Chapter III Audit of Waste Management

3. Most of the ASOSAI member nations are at a nascent stage in the conduct of environment audits. To facilitate the conduct of environment audit on major environmental issues in the ASOSAI region, detailed checklists in the areas of waste management, prevention of air pollution, prevention of water pollution and audit of biodiversity have been devised. These have been discussed in Chapters III, IV, V and VI.

About waste 3.1 According to the Basel Convention, wastes are substances or objects that are disposed or are intended to be disposed or are required to be disposed by the provisions of national laws. Waste includes all items that people no longer have any use for, which they either intend to get rid of or have already discarded. Additionally, wastes are such items which people are required to discard, for example by law because of their hazardous properties. Many items can be considered as waste e.g., household rubbish, sewage sludge, wastes from manufacturing activities, packaging items, discarded cars, old televisions, garden waste, old paint containers etc. Thus, all our daily activities give rise to a large variety of different wastes arising from different sources. The rising quality of life and high rates of resource consumption patterns have had an unintended and negative impact on the environment by generation of waste far beyond the handling capacities of governments and agencies. Cities are now grappling with the problems of high volumes of waste, the costs involved, the disposal technologies and methodologies and the impact of waste on the local and global environment.

Kinds of waste 3.2 Modern urban living brings on the problem of waste, which is increasing in quantity and changing in composition with each passing day. The different kinds of waste are:

- **Municipal waste:** Waste generated by households consisting of paper, plastic, packaging, organic waste, metals etc.
- **Industrial and hazardous waste:** Consists of waste generated during the manufacturing process which turns raw materials into consumer products. Some of this waste can also be hazardous.
- **Biomedical waste:** Waste generated by hospitals and other health providers consisting of discarded drugs, waste sharps, microbiology and biotechnology waste, human anatomical waste, animal waste etc.

- Construction and demolition waste: Waste arising from activities such as the construction and demolition of buildings, creation of infrastructure such as road planning and maintenance etc.
- Mining waste: Waste arising from prospecting, extraction, treatment and storage of minerals.
- E- waste: This consists of end of life products and comprises of a range of electrical and electronic items such as information technology and telecommunication equipment like computers and printers, electrical and electronic tools, washing machines, medical equipment, refrigerators, televisions etc.
- Radioactive waste: Waste that contains a concentration of radio nuclides greater than those deemed safe by national authorities and for which no use is foreseen. Because of the wide variety of nuclear applications, the amounts, types and even physical forms of radioactive waste vary considerably. Some of these wastes remain radioactive for hundreds or thousands of years, while others may require storage for only a short period, while they decay, prior to conventional disposal.
- Other waste: These include end-of-life vehicles, packaging waste, tyres, batteries, agricultural waste, waste from forestry etc.

Impact of waste on health and environment

3.3 Waste represents a threat to the environment and human health if not handled or disposed properly. Surface water contamination takes place when waste reaches water bodies. Ground water contamination takes place when residues from waste leach into the ground water. Residues from waste can change the water chemistry which can affect all levels of an ecosystem. Both surface and ground water contamination can impact the health of lower food chain organisms and consequently, the availability of food through the food chain. It can damage the health of wetlands and impair their ability to support healthy ecosystems, control flooding and filter pollutants from storm water runoff. The health of animals and humans are affected when they drink or bathe in contaminated water. In addition, aquatic organisms like fish and shellfish can accumulate and concentrate contaminants in their bodies. Water from these contaminated sources, when used for irrigation, can affect soil productivity as well as introduce contaminants into the food chain.

A specific environmental hazard caused by waste is leachate, which is the liquid that forms as water trickles through contaminated areas, leaching out chemicals. Movement of leachate from landfills, effluent treating plants and waste disposal sites may result in hazardous substances entering surface water, ground water or soil.

Soil contamination as a result of waste can harm plants when they take up contaminants from their roots. Ingesting, inhaling or touching soil contaminated by waste, as well as eating plants or animals that have accumulated soil contaminants can adversely impact the health of humans and animals. Emissions from incinerators or other waste burning devices and from landfills can also cause air contamination. Incinerators routinely emit dioxins, furans and polychlorinated by-phenyls (PCB), which are deadly toxins, causing cancer and endocrine system damage. Other conventional toxins such as mercury, heavy metals are also released.

Landfills are a big source of release of green house gases which are generated when organic waste decomposes in landfills. Thus, improper handling of waste has consequences both on the environment as well as on the health of the people. Risks to human health and environment are acute when electronic and electrical waste is not managed properly. E-waste contains a mix of toxic substances such as lead and cadmium in circuit boards, lead oxide and cadmium in monitor cathode ray tubes, mercury in switches and flat screen monitors, cadmium in computer batteries, PCBs in older capacitors and transformers and brominated flame retardants on printed circuit boards, plastic casings, cables and polyvinyl chloride cable insulation that release highly toxic dioxins and furans when burned to retrieve copper from the wires. Due to the hazards involved, disposing and recycling e-waste has serious health and environmental implications.

Waste Management



supervision of such operations and after-care of disposal sites'. There are a number of newer concepts about waste management which vary in their usage between countries/regions. The most widely accepted concept is the waste hierarchy which classifies waste management strategies according to their desirability. According to this hierarchy, the priority of any country should be to extract the maximum practical benefits from products and prevent/minimize the waste that is generated. This hierarchy is a stepwise approach to waste management in the order of

environmental priority for different waste management options as detailed in the waste pyramid illustrated above.

The general principle of the waste hierarchy are prevention, minimization, reuse, recycling, energy recovery and disposal with prevention being the most favoured and disposal being the least favoured option. Thus, strategies should focus on waste prevention and minimization through the '3 Rs' - reduce, reuse and recycle. According to this hierarchy, waste disposal strategies are 'end of the pipe' solutions and should be the least favoured option. Emphasis on waste prevention and waste minimisation would ensure that less waste is produced which needs to be disposed.

Waste prevention

3.5 Waste prevention means measures aiming at the reduction of the quantity and harmfulness of diverse waste streams for the environment. Prevention is the most desirable waste management option as it eliminates the need for handling, transporting, recycling or disposal of waste. It provides the highest level of environmental protection by optimizing the use of resources and by removing a potential source of pollution. Some of the techniques of waste prevention are improvement of resource efficiency, reduction of hazardous substances in products, life cycle thinking etc.

- Reducing waste includes any process or activity that avoids, reduces or eliminates waste at its source or results in reuse or recycling.
- Reusing is using an article more than once. This includes conventional reuse where the item is used again for the same function and new-life reuse where it is used for a new function.
- Recycling involves the treatment or reprocessing of a discarded waste material to make it suitable for subsequent reuse either for its original form or for other purposes. It includes recycling of organic wastes but excludes energy recovery. Recycling benefits the environment by reducing the use of virgin materials. Recycling is beneficial in two ways: it reduces the inputs (energy and raw materials) to a production system and reduces the amount of waste produced for disposal.

Some of the reduction and reuse strategies are: promotion of clean technologies and products, establishment of technical standards to limit the presence of certain dangerous substances in products, eco-audit⁶, reuse of scrap material, waste exchanges⁷, ship to the point

⁶ Eco auditing is the assessment made by a company or organisation of the financial benefits and disadvantages to be derived from adopting a more environmentally sound policy.

⁷ Where the waste product of one process becomes the raw material for a second process.

of use⁸, deposit refund schemes⁹, promoting the use of refill packs, extended producer responsibility¹⁰ and product stewardship¹¹.

Major audit issues in management of waste

3.6 Some of the major issues in the management of waste are:

- Existence of database regarding waste.
- Recognition of threats to health and environment posed by waste.
- Existence of waste policy/ laws/rules governing waste management.
- Strategies to reduce, reuse and recycle waste.
- Collection and segregation of waste.
- Processing of waste/recovery of energy from waste.
- Proper waste disposal.
- Proper accountability mechanisms.
- Compliance to waste policies/laws/rules.
- Monitoring of compliance to waste policies/laws/rules.
- Adequacy of infrastructure for waste management.

Compliance Audit of waste issues

3.7 Compliance to environmental policies, rules and regulations relating to waste issues vary from country to country and are governed by specific legislations in vogue in that country. Compliance audit is a major part of any audit exercise and can form the first step in evaluating whether the acts/rules framed by the government relating to waste are being adequately complied with. The issues listed out under Theme 6 (in 3.8 below), that is, compliance and monitoring of rules governing waste management could form the basis for compliance audit also. In addition, certain areas listed below could also be checked during compliance audit:

- Contracts, if any, awarded for waste management, could be examined with reference to the usual audit checks for contracts.
- Targets for inspection of waste management facilities as per law/rule and whether shortfalls in inspection exist.
- Gaps in requirement of manpower and men in position to

⁸ Making deliveries of incoming raw materials or components direct to the point where they are assembled or used in the manufacturing process can minimise handling and the use of protective wrappings or enclosures.

⁹ These offer customers a financial incentive to return packaging for reuse.

¹⁰ Extended Producer Responsibility is a strategy designed to promote the integration of environmental costs associated with products throughout their life cycles into the market price of the products. Firms, which manufacture, import and/or sell products, are required to be financially or physically responsible for such products after their useful life.

¹¹ Product stewardship is a concept whereby environmental protection centers on the product itself and everyone involved in the lifespan of the product is called upon to take up responsibility to reduce its environmental impact. For manufacturers, this includes planning for and if necessary, paying for the recycling or disposal of the product at the end of its useful life. For retailers and consumers, this means taking an active role in ensuring the proper disposal or recycling of an end-of-life product.

implement waste laws.

- Regulations for the issuance of licenses to the various establishments, checklist of conditions to be satisfied before issue of these licenses and cases of omissions and lapses in compliance.
- Strategy for the funding of waste management programs, the sources, conditions, sanctions, releases, payments, expenditure, maintenance of accounts etc.
- Role played by the pollution control boards, local bodies, state Governments, Non Governmental Organisations (NGOs) in dealing with waste management as defined in the laws/acts.
- System of imposing punishments for the failures and non-adherence to the rules/regulations. Imposition, collection, crediting and adequacy of penalties.
- Extent of dues pending recovery, efficiency of the system of imposition and recovery of penalty.
- Inspection/checking of established infrastructure for waste management, facilities established for prevention of pollution.

**Performance
Audit of waste
issues**

3.8 A checklist comprising of major audit themes, audit objectives and audit questions have been listed below. Such a list would act as guidance for the audit of waste management issues.

Objective	Main questions
Theme 1: Assessment of the quantum of waste and risks associated with it	
1. Whether the quantum of waste being generated in the country has been accurately assessed and whether risks to environment and health posed by waste have been identified.	1.1 Has an assessment of quantum of each kind of waste been made at the macro as well as micro level according to waste sources (like industries, households, hospitals etc.) amounts and types (municipal solid waste, bio-medical waste, hazardous waste, e-waste etc.) to get an accurate picture of the waste being generated in the country and states.
	1.2 Has an identification and analysis of the expected parameters of significance for waste generation like increase in waste due to increase in population, greater economic growth, increase in demand for consumer goods, changes in manufacturing methods etc., and the composition of waste been done at central and state level.

	1.3 Has an assessment been made about the current capacity to handle waste and whether more capacity needs to be created based on the quantity of waste being generated.
	1.4 Has any entity/government identified the risks to environment as a result of improper management of waste and waste accumulation.
	1.5 Has the government identified risks to human health as a result of improper management of waste.
Theme 2: Recognition of waste as a cause of environmental degradation	
2. Whether waste has been adequately recognized as a cause of environmental degradation by environmental legislations and country's planning authorities.	2.1 Does the legislation on protection of environment recognize waste as one of the threats to the environment in the country.
	2.2 Do planning documents recognize the management of waste as a priority area for sustainable development of the country.
Theme 3: Government policies on waste minimization and waste reduction	
3. Whether policies on waste management reflect the priority of waste reduction and waste minimization in preference to waste disposal.	3.1 Has the government enacted a separate policy for waste management and does the waste policy define the hierarchy governing waste management.
	3.2 Has the government prepared an action plan for the reduction of each kind of waste.
	3.3 Has the government put in place waste prevention, reduction, reuse and recycle strategies which will reduce the waste being generated in the country.
	3.4 Has the government taken any action on consumer information and education to promote waste minimization, specifically reduction, reuse and recycling.

	3.5 Does an environment labelling program exist and has it succeeded in its objective of promoting the use of environmental friendly products.
Theme 4: Existence of legislations for disposal of all kinds of waste	
4. Whether environmental legislations dealing with disposal of each kind of waste exists and whether clear responsibility and penalty for violation has been incorporated in the legislations already enacted.	4.1 Do legislations /rules exist in the country for the disposal of all types of waste.
	4.2 Do all the legislation/rules for the management of waste exist in a framework in one place for easy understanding and implementation.
	4.3 Whether the laws/rules incorporate responsibility and penalty for violation (polluter pays principle) of waste laws.
Theme 5: Allocation of responsibility for the management of waste	
5. Whether the various agencies involved in the process have been identified and allocated clear responsibility and accountability for waste management and whether a mismatch/gap/overlap exists among the responsibility centres.	5.1 Has a nodal agency regarding waste management issues been identified at central and state level.
	5.2 Have policy making bodies for each kind of waste been created.
	5.3 Have bodies for implementation of waste laws and rules been created.
	5.4 Have bodies been created and entrusted responsibility for monitoring the implementation of laws/ rules on waste.
	5.5 Have regulatory bodies been set up to fix standards for emissions and effluents generated by waste.
	5.6 Is there a body to assess the pollution being caused by the different types of wastes.
Theme 6: Compliance to and monitoring of rules governing waste management	
6. Whether compliance	6.1 Are the municipal authorities managing

<p>to laws relating to waste is taking place and whether the monitoring mechanism is effective in checking non-compliance.</p>	<p>and handling solid waste in accordance with the compliance criteria and procedure laid down in law.</p>
	<p>6.2 Is municipal solid waste being collected as envisaged under law.</p>
	<p>6.3 Is segregation of municipal waste taking place as envisaged under law.</p>
	<p>6.4 Have municipal authorities established and maintained storage facilities in such a manner so that they do not create unhygienic and unsanitary conditions around it.</p>
	<p>6.5 Is the transportation of municipal solid waste taking place as envisaged under the law.</p>
	<p>6.6 Is the processing of municipal solid waste done as envisaged under the law.</p>
	<p>6.7 Is the disposal of municipal solid waste being done as envisaged in the law.</p>
	<p>6.8 Is the management of bio-medical waste being done in accordance with the law.</p>
	<p>6.9 Has the segregation and labelling of bio-medical waste prior to storage, transportation, treatment and disposal been done as per the law.</p>
	<p>6.10 Is the disposal of plastic waste being done as per the law.</p>
	<p>6.11 Is the disposal of industrial waste being done as per the law.</p>
	<p>6.12 Is the disposal of hazardous waste being done as per the law.</p>
	<p>6.13 Is the disposal of any other kind of waste for which laws have been enacted,</p>

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	disposed as per the laws.
	6.14 Whether monitoring mechanism was effective in checking non-compliance with the provisions of laws governing waste management.
Theme 7: Evaluation and feedback mechanism	
7. Whether a sound system for taking effective action on the collected feedback has been evolved?	7.1 Have any evaluation studies been carried out regarding implementation of these laws.
	7.2 Have the recommendations made by the independent evaluation agencies been incorporated in the Acts/rules.
Theme 8: Adequacy of funding and infrastructure	
8. Whether funding and infrastructure was adequate for the implementation of rules on waste management and whether the funds/infrastructure have been used economically, efficiently and effectively.	8.1 Are funds being provided for implementation of waste management laws/rules.
	8.2 Is the funding adequate for waste management activities.
	8.3 Whether need assessment for technically qualified manpower to implement and monitor waste management has been made and have these been deployed effectively.
	8.4 Whether facilities to monitor pollution and environmental degradation as a result of waste exists with the pollution monitoring agency.

The themes listed out above indicate common areas of enquiry in audit of waste management. Individual themes could also be picked up as an area of enquiry, depending on the needs of the SAI.

Chapter IV Audit of Air Pollution

About air pollution **4.1** The atmosphere consists of a mixture of many different gases, about 78 per cent of it is nitrogen, about 21 per cent is oxygen and the remaining 1 per cent is a mix of argon, carbon dioxide, methane, hydrogen, helium, neon, ozone and other gases in trace amounts. The atmosphere extends upward for roughly 160 kilometres (kms) above the surface of the earth. Troposphere is the lowermost layer of the atmosphere. Only about 12 kms thick, it is in this relatively thin layer of air that oxygen-dependent life is sustained, clouds are formed, weather patterns develop and most of our air pollution problems occur. Stratosphere, the layer of air above the troposphere is a stable layer that extends upward to an altitude of about 30 kms. The stratosphere contains only a small fraction of the total air mass because of the lower air density and contains much more ozone than the troposphere and ozone in the stratosphere plays an important role in protecting living organisms on the earth from the sun's harmful ultraviolet (UV) radiation. The UV rays are absorbed by ozone molecules and are then converted into heat energy, the ozone acting as a protective filter. Mesosphere, ionosphere and thermosphere are layers of the atmosphere above the stratosphere.

Types and sources of air pollutants **4.2** Air pollution can be defined as the presence of 'foreign' substances in the atmosphere in high enough concentrations and for long enough duration to cause undesirable effects. Substances that are generally recognized to be air pollutants resulting from human activity include particulates, sulphur dioxide, nitrogen dioxide, carbon monoxide, hydro carbons, ozone, lead etc.

Effects of air pollution **4.3** Air pollution can have the following effects:
Effects on Human Health: Major health effects include acute (short-term but severe) illness, or death; chronic (long-term) respiratory illness, including bronchitis, emphysema, asthma, and possibly lung cancer and temporary eye and throat irritation, coughing, chest pain and malaise or general discomfort. Sulphur dioxide, nitrogen dioxide and ozone cause eye and throat irritation, coughing and chest pain. These pungent gases can harm lung tissue when inhaled into the respiratory tract and are associated with bronchitis, emphysema and other lung diseases. Inhalation of particulates also affects the breathing process adversely. Although larger particles are captured by the protective mucus lining and cilia in the nose and throat, smaller particles can penetrate deep

into the lungs. Certain particulates are especially dangerous because of their toxic or carcinogenic properties like lead fumes in automobile exhausts and asbestos fibres. Carbon monoxide (CO), a colourless and odourless gas is very lethal as it can be inhaled without causing irritation or immediate discomfort. It combines readily with haemoglobin in the blood and takes up the place ordinarily occupied by oxygen. The inhaled CO reduces the ability of blood to transfer oxygen to body cells, leading to asphyxiation or suffocation. Even lower concentrations of CO can cause illness or reduced mental awareness.

Effects on plants, animals and the atmosphere: Some air pollutants cause collapse of the leaf tissue; others bleach or discolour leaves. Certain air pollutants also cause harm to cattle and other livestock, but this is usually a localized problem on farms near specific industrial plants that cause the pollution. The most noticeable effect of air pollution is on the atmosphere itself. Specifically, it is the haze and reduction of visibility due to the scattering of light by suspended particles. Particulates can also affect weather conditions by increasing the frequency of fog formation and rainfall.

Greenhouse effect: Greenhouse effect is caused by carbon dioxide which is not ordinarily considered an air pollutant and which is a normal, although a minor component of the atmosphere. Carbon dioxide is released into the atmosphere in vast quantities as a by-product of fossil fuel combustion (coal, oil, gas), which is used in industrial activity and power generation. According to IPCC¹², global greenhouse gas (GHG) emissions due to human activities have grown since pre-industrial times, with an increase of 70 per cent between 1970 and 2004. Global warming, the rise of temperatures worldwide, is usually attributed to the greenhouse effect. The most deleterious effect of global warming would be the melting of the Arctic ice packs, which is expected to raise the sea level by about 1 meter which will cause extensive economic and social hardship in low lying land areas and coastal areas all over the world.

Acid rain: The term 'acid rain' refers to the fact that in recent years, the average pH¹³ of rainfall has been decreasing significantly below its normal value. Many species of fish, trees and agricultural crops are very sensitive to pH values and do not thrive under acidic conditions. Many lakes in certain regions no longer support fish life.

¹² The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body set up by the World Meteorological Organization and by the United Nations Environment Program to provide decision-makers and others interested in climate change with an objective source of information about climate change.

¹³ pH is a measure of the acidity or basicity of a solution; pure water is said to be neutral.

Most scientists agree that the death of these once productive lakes is directly attributable to acid rainfall. Acid rain also accelerates the rate at which minerals leach out of the soil, which reduces soil fertility, diminishing the growth and productivity of forests and agricultural crops. Leaching of certain metals from the soil into the groundwater may also contaminate drinking water supplies. Finally, acid rainfall speeds up the physical deterioration of concrete, metal and other exposed material.

Measurement of air quality

4.4 It is necessary to measure the amount or concentration of the various pollutants in order to evaluate air quality and to design appropriate air pollution control systems. Ambient samples are collected from the open atmosphere, after pollutants from various sources have been dispersed and mixed together under natural meteorological conditions. Ambient, or atmospheric sampling, serves several purposes. It provides 'background' air quality data in urban or rural areas and a basis for developing and updating ambient air quality standards. Monitoring ambient air quality also provides data to determine if established standards are being met or exceeded. Impending air pollution episodes or emergencies can be predicted in advance, by examining ambient air quality along with meteorological data; this provides time for health officials to warn the public. Source or emissions sampling is performed right at the point of pollutant discharge such as at a vehicle tailpipe or a smokestack. A basic purpose of source sampling is to evaluate the pollution discharged from a specific generator and to use the results to determine if the emission standards are being met. The other purposes of emissions sampling are to provide data for designing and operating air cleaning equipment and to measure the working efficiency of that equipment.

Major issues in audit of air pollution

- 4.5** Some major issues in the audit of air pollution are:
- Data about sources and extent of air pollution.
 - Recognition of threats to health and environment posed by air pollution.
 - Existence of policy/ laws/rules for the control of air pollution.
 - Existence and adherence to air quality criteria.
 - Penalties for violation of air quality criteria.
 - Programs /strategies to reduce air pollution.
 - Compliance to programs /strategies to reduce air pollution.
 - Monitoring of compliance to programs /strategies to reduce air pollution.
 - Adequacy of infrastructure to control air pollution.

**Compliance
audit of issues
relating to
prevention of
air pollution**

4.6 Compliance to environmental policies, rules and regulations relating to prevention of air pollution vary from country to country and are governed by specific legislations in vogue in that country. Compliance audit is a major part of any audit exercise and can form the first step in evaluating whether the acts/rules framed by the government relating to prevention of air pollution are being adequately implemented. The issues listed out under Theme 4 and 5 (in 4.7 below), that is, compliance to and monitoring of rules governing prevention of air pollution could form the basis for compliance audit also. In addition, certain areas listed below could also be checked during compliance audit:

- Utilisation of funds for prevention of air pollution.
- Setting up of pollution standards for different classes of industries and vehicles.
- Reduction of pollutants in the air as a result of air pollution control programs.
- Identification of major industries polluting the air and action taken against them.
- Sufficiency of equipment and trained manpower in laboratories monitoring air pollution to enable them to carry out monitoring on a sustained basis.
- Monitoring of achievement of targets set for prevention of pollution.
- Extent of fulfillment of obligations under the international accords to which the country is a signatory.

**Performance
audit on air
pollution**

4.7 A checklist comprising of major audit themes, audit objectives and audit questions relating to control of air pollution have been listed below. Such a list would act as guidance for the audit of air pollution control issues.

Objective	Main questions
Theme 1: Assessment of the levels of air pollution and its hazards	
1. Whether quantum of air pollution has been accurately assessed and the risks to human health, ecosystem and environment have been studied.	1.1 Has an assessment of quantum of each kind of air pollutant (particulates, sulphur dioxide, nitrogen dioxide, carbon monoxide, hydro carbons, ozone, lead etc.) been made at the macro level by centre as well as at the micro level by the states. Have the sources contributing to air pollution like power plants, municipal waste incinerators, burning woods, oil refineries, manufacturing facilities

	<p>(like synthetic, organic, agricultural, chemical, pharmaceutical, paints, aerosol, electrical appliances, refrigeration & air conditioning), landfills, commercial automobiles, privately owned automobiles, locomotives, aircrafts, marine vessels, container ships and cruise ships been identified and whether the quantum of air pollution by each source has been assessed.</p>
	<p>1.2 Has an identification and analysis of the expected parameters of significance for air pollution like increase in air pollution due to increase in population, seasonal changes, greater economic growth, increase in the number of private vehicles, etc., been done at central and state level.</p>
	<p>1.3 Has the government identified risks to environment (on air quality) as a result of air pollution.</p>
	<p>1.4 Has the government identified risks to human health caused by air pollution.</p>
<p>Theme 2: Existence of rules and regulations pertaining to air pollution</p>	
<p>2. Whether clear rules and regulations/action plan/strategies have been enacted to control air pollution and whether clear responsibility and penalty for violation has been incorporated in the legislations already enacted.</p>	<p>2.1 Whether a separate law/rule has been enacted to control air pollution and whether these laws/rules are adequate to effectively control air pollution.</p>
	<p>2.2 Whether all sources of air pollution like from power plants, municipal waste incinerators, burning woods, oil refineries, manufacturing facilities (like synthetic, organic, agricultural, chemical, pharmaceutical, paints, aerosol, electrical appliances, refrigeration & air conditioning, landfills, commercial automobiles, privately owned automobiles, locomotive, aircraft, marine vessels, container ships and cruise ships) have been taken into account while framing laws/rules for control of air pollution.</p>

	2.3 Whether the government has defined acceptable levels for each kind of pollutant and do these levels vary with international standards.
	2.4 Whether the laws/rules incorporate responsibility and penalty for violation of air pollution control laws/rules.
	2.5 Has the Government made any strategy/action plan with clear timelines and commitment for reduction of quantities for air pollution.
	2.6 Has the Government framed policies/ strategies/ action plans for air pollution reduction and have these been communicated to all stakeholders.
	2.7 Has the suitable technology been adopted to minimize the environmental and health hazards caused by air pollution.
Theme 3: Allocation of responsibility for control of air pollution	
3. Whether the various agencies involved in the process of control of air pollution have been clearly identified and whether clear responsibility and accountability for air pollution management has been allocated among them and whether there is a mismatch/gap/overlap among the responsibility centres.	3.1 Has a nodal body for control of air pollution been identified both at the macro and the micro levels.
	3.2 Has the primary agency for making policy/legislation/strategy for control of air pollution been identified at the macro as well as micro levels.
	3.3 Have bodies been created and entrusted responsibility for the implementation of laws/ rules on air pollution.
	3.4 Have bodies been created and entrusted responsibility for the monitoring of laws/ rules on air pollution.
	3.5 Has a regulatory agency being created for measuring air pollution, setting acceptable levels of air pollution and revising it regularly to ensure better control.

Theme 4: Compliance of air pollution rules and regulations	
4. To ascertain the level of compliance to air pollution rules and regulations already in existence.	4.1 Are all the entities causing air pollution acting in accordance with the compliance criteria and procedures laid down in law.
Theme 5: Monitoring	
5. Whether effective monitoring was done to ensure compliance to defined acceptable levels for each kind of pollutant.	5.1 Whether monitoring mechanism was effective in checking non-compliance with the provisions of air pollution control laws/rules.
	5.2 Whether a system was in place for regular and sustained monitoring.
	5.3 Whether penalty was imposed, when required, on a regular basis as a result of monitoring of levels of air pollution.
	5.4 Whether any independent review/evaluation been carried out regarding implementation of these laws/rules.
Theme 6: Adequacy of funding and infrastructure	
6. Whether funding and infrastructure was adequate to ensure effective compliance and monitoring of air pollution control programs.	6.1 Are funds being provided at the macro level by the central government for implementation of air pollution prevention rules.
	6.2 Are funds being provided at the micro level by the provincial/state governments for implementation of air pollution prevention rules.
	6.3 Whether need assessment for manpower to implement and monitor air pollution prevention programs has been made and has the manpower been deployed effectively.

The themes listed out above indicate common areas of enquiry in audit of air pollution. Individual themes could also be picked up as an area of enquiry, depending on the needs of the SAI.

Chapter V Audit of Water Pollution

About water issues 5.1 Water is a crucial resource for all existence on this earth as well as an essential part of the global ecological system. Water quality and quantity problems are a major concern in all the countries. Nevertheless, specific issues relating to water can differ from region to region and from country to country.

Water availability 5.2 Water stocks on earth can be divided into two categories i.e. salt water and fresh water. The total volume of water on earth is about 1386 million cubic km. Only 2.5 per cent of the total volume of water is fresh water and less than 1 per cent of all fresh water is directly available for human use. From a global point of view, water is unevenly distributed, with great natural variations in availability at the local level. Drought and desertification are day-to-day realities for many people and have a devastating impact on people's livelihoods. Availability of water for purposes like drinking, irrigation and industrial use are the major concerns.

Agenda 21 of the World Commission on Sustainable Development in June 1992 recognized that the objective of water management is to maintain adequate supplies of water of a good quality for the entire population, while preserving the hydrological, biological and chemical functions of ecosystems, adapting human activities within the capacity limits of nature and combating vectors of water-related diseases. Agenda 21 has identified the following key action areas for the freshwater sector.

- Drinking water supply and sanitation for urban and rural development.
- Water for sustainable food production.
- Protection of water resources, water quality and aquatic ecosystems.
- Water resource assessment including evaluation of impacts of climate change on water resources.
- Integrated water resources development and management.

Water Pollution 5.3 Water resources in most developing countries are being polluted beyond their capacity to sustain traditional uses because of high population growth rates. Increasing urbanization and industrialization have exacerbated the situation by creating very large 'point' sources of pollution. Major centers of population and rural agro-industry have seriously damaged surface water quality,

even in very large rivers and groundwater has also been contaminated. The major threats to oceans are marine pollution, over-exploitation of living marine resources and coastal habitat loss. Different sectors of human activity cause marine and coastal degradation. Globally, dumping and spills by ships and sewage are a large source of contamination of marine and coastal environment. In addition, agricultural nutrient run-off and atmospheric inputs, derived from vehicle and industrial emissions, are major sources of contamination. The principal water sources for direct human use are lakes, rivers, soil moisture and the relatively shallow groundwater basins. These principal water sources are a very small proportion of the total volume of water on earth (0.01 per cent). Sources of pollution include untreated sewage, chemical discharges, petroleum leaks and spills, dumping of waste in old mines and pits and agricultural chemicals and manure that are washed off or seep downward from farms. Around the world, 261 river basins are shared by two or more countries. More than half the world's major rivers are 'seriously depleted and polluted, degrading and poisoning the surroundings ecosystems, threatening health and livelihood of people who depend on them'. Groundwater reservoirs, also referred to as aquifers, are also vulnerable to threats of contamination and overuse.

Major audit issues relating to water

5.4 Some of the major issues relating to audit of water encompass a very wide spectrum of concerns that are related directly and indirectly to water management. Some of these issues are:

- **Fresh water management:** Lack of access to clean water for drinking, food preparation & sanitation, pollution of ground water/surface water.
- **Water policy instruments:** Water policy, water pricing, water legislations, permits, inspection & enforcement, fees & fines, investments in infrastructure, scientific research, monitoring and evaluation.
- **Marine environment:** Loss of biodiversity due to pollution, over-exploitation of living marine resources and coastal habitat loss.
- **Environmental agreements:** Marine environment, rivers & lakes, drinking water, sanitation, biodiversity of water ecosystems and extreme events like drought & flooding.

As audit of water management has a very comprehensive coverage, the scope of this guidance is limited to audit of water pollution issues detailed below.

- Major audit issues relating to water pollution** 5.5 Some of the major audit issues relating to water pollution are:
- Data about sources and extent of water pollution.
 - Recognition of threats to health and environment posed by water pollution.
 - Existence of policy/laws/rules for the control of water pollution.
 - Existence and adherence to water quality criteria.
 - Penalties for violation of water pollution quality criteria.
 - Programs/strategies to reduce water pollution.
 - Compliance to programs/strategies to reduce water pollution.
 - Monitoring of compliance to programs/strategies to reduce water pollution.
 - Adequacy of infrastructure to control water pollution.
- Compliance Audit of water pollution issues** 5.6 Compliance to environmental policies, rules and regulations relating to water pollution vary from country to country and are governed by specific legislations in vogue in that country. Compliance audit is a major part of any audit exercise and can form the first step in evaluating whether the acts/rules framed by the government are being adequately complied with. The issues listed out under Theme 4 and 5 (in 5.7 below), that is, compliance to and monitoring of rules governing control of water pollution could form the basis for compliance audit also. In addition, certain areas listed below could also be checked during compliance audit:
- Setting up of water pollution standards.
 - Monitoring of achievement of targets set for control of pollution.
 - Identification of major industries polluting the water and action taken against them.
 - Reduction of pollutants in the water as a result of water pollution programs.
 - Utilization of funds for control of water pollution.
 - Extent of fulfillment and implementation of obligations under the international accords to which the country is a signatory.
 - Sufficiency of equipment and trained manpower in laboratories monitoring water pollution to enable them to carry out monitoring on a sustained basis.
- Performance audit on water pollution** 5.7 A checklist comprising of major audit themes, audit objectives and audit questions relating to control of water pollution has been listed below. Such a list would act as guidance for the audit of

water pollution related issues.

Objective	Main questions
Theme 1: Existence of database and identification of risks	
1. Whether database of the sources and quantum of pollution of rivers/lakes/water sources has been created and has the risks to the river and health been assessed by the central government for the control of pollution.	1.1 Whether all causes/sources of pollution to the rivers/lakes/ground water/water sources have been identified.
	1.2 Whether the contribution of each source of pollution has been quantified.
	1.3 Whether risks to the health as a result of pollution to rivers/lakes/ground water/water sources have been identified.
	1.4 Whether risks to the environment as a result of pollution to rivers/lakes/ground water/water sources have been identified.
Theme 2: Effective planning for the control of water pollution	
2. Whether planning for control of pollution was effective and took into account data and identification of risks.	2.1 Whether planning for the control of pollution was based on accurate/ recent/reliable data.
	2.2 Whether planning for the control of pollution was based on assessment of risk.
	2.3 Whether planning for the control of pollution was based on assessment of requirement/ availability of funds.
Theme 3: Clear allocation of responsibility and accountability	
3. Whether various agencies involved in the control of pollution have been allocated clear responsibility and accountability for planning, implementation and monitoring.	3.1 Whether there was allocation of responsibility and accountability to agencies for planning.
	3.2 Whether there was clear delineation of responsibility and accountability to agencies implementing the programs for the control of pollution.
	3.3 Whether there was clear delineation of agencies for monitoring (including monitoring of infrastructure for the control of pollution).

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	3.4 Whether there was clear delineation of regulatory agencies for measurement and setting of standards for the control of water pollution.
Theme 4: Effective implementation of measures to control water pollution	
4. Whether implementation of the program for the control of pollution resulted in the creation of the infrastructure envisaged under the program and were these functioning as envisaged.	4.1 Whether infrastructure for the control of pollution created under the program for the control of pollution as envisaged.
	4.2 Whether infrastructure created for the control of pollution was being utilised and maintained as envisaged.
Theme 5: Monitoring	
5. Whether monitoring of implementation of the program for the control of pollution took place effectively and whether monitoring was undertaken to ensure operation of the pollution control measures after they were created.	5.1 Whether effective monitoring of program implementation took place to ensure that the program objectives were met.
	5.2 Whether the infrastructure created under the program for the control of pollution was effectively monitored to ensure that it met set/designed performance parameters.
	5.3 Whether regular and effective monitoring of pollution levels of rivers/lakes/ground water/water sources took place.
Theme 6: Utilization of funds	
6. Whether funds were utilized in an efficient and economic manner to further the aim of reducing pollution from the rivers/lakes/ ground water/water sources.	6.1 Whether funds allocated to the states under the program for the control of pollution were released timely to the implementing agencies/states.
	6.2 Whether the funds were utilized economically and efficiently by the states.
Theme 7: Impact analysis	
7. Whether the program for the control of pollution had succeeded	7.1 Whether there was improvement in water quality as a result of implementation of the program for the control of pollution.

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in reducing pollution levels in rivers/lakes/ground water/water sources and restoring water quality.	7.2 Whether external evaluation of the program for the control of pollution was done.
	7.3 Whether performance of the infrastructure created for the control of water pollution was as per set/designed performance parameters.

The themes listed out indicate common areas of enquiry in audit of control of water pollution. Individual themes could also be picked up as an area of enquiry, depending on the needs of the SAI.

Chapter VI **Audit of Biodiversity**

About biodiversity **6.1** The term 'biological diversity' is used to refer to all aspects of variability in the living world, including diversity within and between individuals, populations, species, communities and ecosystems. Often the term biodiversity is commonly used to refer to all species and habitats in some given area for the variety of life and includes plants, animals and micro-organisms, their genes and the systems they inhabit.

Importance of protection of biodiversity **6.2** Biological resources are the pillars on which civilizations are built. The loss of biological diversity threatens food supplies, opportunities for recreation/tourism and sources of wood/medicines/energy. It also interferes with essential ecological functions. Nature's products also support such diverse industries as agriculture, pharmaceuticals, pulp and paper, horticulture, cosmetics, construction and waste treatment. Goods and services provided by ecosystems or biological diversity are food, fuel/fibre, shelter/building material, purification of water, detoxification/decomposition of wastes, stabilization/moderation of the earth's climate and moderation of floods/droughts/temperature extremes/forces of wind. It also provides for the generation/ renewal of soil fertility, pollination of plants, control of pests and diseases, maintenance of genetic resources as key inputs to crops variety and livestock breeds.

Main issues related to biodiversity **6.3** Major audit issues related to biological diversity are:
Species extinction: A major concern about biological diversity is the issue of species extinction. Even though the loss of species is a natural process, such as the extinction of dinosaurs, the rate of extinction has accelerated dramatically because of increased human activity. Some estimates put the current rate of extinction at 10,000 times higher than the natural or background rate. These activities include poaching/illegal hunting, destruction of natural habitats and overexploitation of resources. Extinction raises specific concerns because of its irreversibility.

Habitat loss and fragmentation: Habitat is 'the place or type of site where an organism or population naturally occurs'. Habitat loss is identified as a main threat to 85 per cent of all species. Studies indicate that urbanization has increased the rate of habitat loss due to clearing of land to meet the demand for development. Deforestation and agricultural expansion are other leading causes of habitat loss. Loss/fragmentation of habitat is the greatest threat to biodiversity and is one of the main causes of extinction of species.

Thus, the most effective way to conserve biodiversity is to prevent the degradation of habitats.

Introduced species: Introduced, alien or exotic species are defined as species of plants, animals and micro organisms introduced outside their natural past or present distribution. Alien species are 'invasive' when they establish and spread in the new environment and threaten the native species, the environment, the economy or some aspect of society. Alien or exotic species are introduced in an area outside their natural range as a result of both intentional and accidental dispersal by human activities.

Fishing Practices: Some of the threats to marine species result from accidental entanglement and drowning in fishing nets (dolphins, sea turtles), disturbance/destruction of nest sites (seabirds, turtles, seals) and illegal catch of adult species (turtles, seals). Some harmful impacts from human activities to inland water ecosystems are from physical alteration and destruction of habitat through abstraction of water, drainage, canalization, flood-control systems and construction of dams/reservoirs.

Over-exploitation: With world population being more than 6 billion people, there are increasing needs for living and food cultivation space. Therefore, the life on earth is increasingly being altered by humans. Old ways of harvesting are being replaced by intensive technologies often without controls to prevent over-harvesting. Unsustainable use of natural resources leads to the loss of biological diversity.

Pollution: Another major threat to biodiversity is pollution. Pollutants affect the health of species directly (by breathing) and indirectly (eating). Air pollution does not recognize international borders because atmospheric pollutants drift with prevailing currents and are deposited far from their original source. Pollution in water bodies and land masses contribute significantly to the ill health of species and to the destruction of biological diversity.

Overgrazing and over cultivation of grasslands: Overgrazing of grasslands have significant repercussions on the land surface. Overgrazing can cause serious deterioration of grasslands system. The ground becomes barren and most of the moisture from rain is lost by runoff and evaporation, thereby disrupting the water cycle. This also increases soil erosion. The top soil fails to hold water and the flow of water takes the top soil with it. Overgrazing desert grasslands also affects the natural vegetation. Lacking moisture and nutrients, the original plants cannot maintain themselves and the vegetative cover continues to decrease until only erosion pavement remains.

Desertification: Desertification refers to 'land degradation in arid,

semi-arid and dry sub-humid areas brought about by factors such as climatic variations and human activities'. According to United Nations Convention to Combat Desertification (UNCCD), around 3,600 million hectares or 70 per cent of the world's dry lands (excluding hyper-arid deserts) are degraded. Some reasons for desertification are human activities and over-cultivation.

Methods of protecting and conserving biodiversity

6.4 Public concern about conservation of biodiversity has been growing due to heightened awareness of the need to maintain biodiversity within known limits of natural rates of speciation¹⁴ and extinction. One of the ways to protect the biological diversity is by creation of protected areas such as national parks. Properly managed and protected areas provide a refuge for species and their ecosystems. This is known as 'in-situ' conservation, which is the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. Where there is no availability of in-situ conservation, the alternative is 'ex-situ' conservation. Ex-situ conservation is the conservation of components of biological diversity outside their natural habitats such as zoos for living animals and related species, botanical gardens for plantations and gene banks for preservation of species generation. These measures may provide an 'insurance' against extinction.

A second method is conserving individually endangered and rare species such as the animals and plants listed under the IUCN¹⁵ Red List¹⁶, especially in protected areas containing high species richness or high degree of endemism. Efforts have to be made to identify the areas and protect them against illegal activities such as burning, cultivating, hunting and poaching. Conservation should be focused on critical, unique and representative habitats and as a result may then be considered as protected areas.

Another strategy is through increasing the public awareness about biological diversity and ecosystem through mass media.

Finally, another approach of conserving biological diversity is through signing of treaties or agreements and approving resolutions to protect biological diversity.

Major issues in the audit of biodiversity

6.5 Major audit issues in the audit of biodiversity could be:

- Government programs for the protection of biodiversity and protection of animals like tigers, elephants, turtles, pandas, dolphins, camels, arabian oryx, alligators etc.

¹⁴ Evolutionary process by which new biological species arise.

¹⁵ IUCN, the International Union for Conservation of Nature is the world's oldest and largest global environmental network with more than 1,000 government and NGO member organizations, and almost 11,000 volunteer scientists in more than 160 countries.

¹⁶ Provides taxonomic, conservation status, and distribution information on species that are facing a high risk of global extinction.

- Government programs to preserve biodiversity such as programs for eradication of plant species that have a negative impact on biodiversity.
- Audit of the government's performance of the implementation of international accords on biodiversity like:
 - *Convention of Biological Diversity (1993)* which seeks to ensure (i) conservation of biological diversity (ii) sustainable use of its components and (iii) promotion of fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Through international co-operation, the convention also seeks to ensure that the international trade in species of wild fauna and flora does not threaten survival, in the wild, of the concerned species.
 - *The Cartagena Protocol on Biosafety* is an international treaty governing the movements of living modified organisms resulting from modern biotechnology from one country to another. It was adopted as a supplementary agreement in the year 2000 to the Convention on Biological Diversity.
 - *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)* which seeks to ensure, through international co-operation, that the international trade in species of wild fauna and flora does not threaten survival in the wild of the species concerned.
 - *Convention on Wetlands or RAMSAR Convention* which seeks the conservation and wise use of wetlands by national action and international co-operation as a means to achieve sustainable development throughout the world.
 - *Convention to Combat Desertification* is a convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

Compliance audit of biodiversity issues **6.6** Compliance to environmental policies, rules and regulations relating to biodiversity vary from country to country and are governed by specific legislations in vogue in that country. Compliance audit is a major part of any audit exercise and can form the first step in evaluating whether the acts/rules framed by the government are being adequately complied with. The issues listed out under Theme 4 (in 6.7 below), that is, compliance to and monitoring of rules governing biodiversity could form the basis for compliance audit also. In addition, certain areas listed below could also be checked during compliance audit:

- Existence of identification and survey of biodiversity.

- Adherence to plan for protection of biodiversity.
- Existence of strategy for the sustainable use of natural resources.
- Adherence to Biodiversity Action Plan for the Conservation of Natural Resources, agriculture, fisheries, wild bird species etc.
- Compliance to strategies for combating deforestation.
- Monitoring the ban on trade in endangered species of flora and fauna.
- Monitoring the protection of vulnerable marine ecosystems.

Performance audit of biodiversity **6.7** Since the measures to preserve biodiversity widely vary from country to country, we have attempted a general checklist for the audit of biodiversity issues which is directed at government attempts to protect biodiversity.

Objective	Main questions
Theme 1: Identification of the main threats to biodiversity of a country	
1. To assess whether the government has assessed the country's biodiversity and threats to it.	1.1 Has the government assessed the biological resources available in the country.
	1.2 Has the government identified the primary threats to each of these resources and its diversity.
Theme 2: Government's role in mitigating threats to biodiversity	
2. To assess the government's efforts in mitigating threats to biodiversity.	2.1 Has the government signed and ratified any International convention and treaty for the protection of biodiversity.
	2.2 Has the government enacted legislation and regulations for the protection of all kinds of biodiversity, especially those that are facing threats.
	2.3 Has the government introduced specific programs for the protection of biodiversity, especially those that are threatened.
	2.4 Has the government devised any economic tool and incentives to protect biodiversity.
	2.5 Has the government made it mandatory to get environmental impact assessments conducted for projects to mitigate threats to biodiversity.
Theme 3: Allocation of responsibility and accountability	

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3. Has the government allocated responsibility and accountability to agencies for protection of biodiversity.	3.1 Has the government allocated responsibility to any agency for defining environmental policies dealing with the protection of biodiversity.
	3.2 Has the government allocated responsibility to any agency for ensuring that environmental laws are being enforced by public and private entities.
	3.3 Has the government allocated responsibility to any agency for preparing environmental standards relating to biodiversity issues.
	3.4 Has the government allocated responsibility to any agency for issuing licences to limit the volume or concentration of pollutants discharged into the environment for the purpose of protecting biodiversity.
	3.5 Has the government allocated responsibility to any agency for monitoring potential environmental damage and applying penalties when laws are violated.
Theme 4: Monitoring of government programs for the protection of biodiversity	
4. To ascertain whether monitoring and evaluation mechanism helped in effective implementation of the program.	4.1 Whether there was any system of regular and sustained monitoring of implementation of government programs for protection of biodiversity.
	4.2 Whether there was any system of reporting and accountability.
	4.3 Whether there was any system of independent (third party) evaluation of implementation of programs and whether feedback from independent evaluation was used to improve the programs.
Theme 5: Adequacy of funding and infrastructure	
5. Whether funding and infrastructure was adequate to ensure effective compliance and monitoring for government programs for the protection of	5.1 Were adequate funds being provided timely to concerned agencies for implementing government programs for protection of biodiversity.
	5.2 Whether need assessment for manpower to implement and monitor programs for protection of biodiversity has been made and

biodiversity.

has the manpower been deployed effectively.

The themes listed out above indicate common areas of enquiry in audit of biodiversity. Individual themes could also be picked up as an area of enquiry, depending on the needs of the SAI.

Chapter VII

Database of Environment Audits conducted by ASOSAI Member Nations

Over the years, ASOSAI member nations have conducted environment audit, both performance and compliance, on a wide variety of subjects. Since 2000, there has been a perceptible increase in the number of environment audits and more and more member nations are taking up such audits. In this context, a list of environment audits conducted by ASOSAI member nations from 2000 has been collated. This database will also help in sharing the experiences gained by one nation on audit of specific environmental issue among other ASOSAI member nations, especially those who have just started conducting environment audits. While it is recognized that laws/rules/regulations in one member nation would vary from one nation to another, the idea of such a database is to focus on the various environmental issues which could be explored as areas for conducting environment audits within ASOSAI member nations.

A theme-wise list of all the environment audits conducted by ASOSAI member nations in the areas of waste, air, water and biodiversity are attached as **Annex 1, 2, 3 and 4** respectively.

Annex 1

Database of Environment Audit reports relating to Waste issues in ASOSAI nations

No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
1.	Bhutan	Audit of Municipal Waste	2008	There was a lack of records on solid waste and involvement of multiple agencies in framing policies, rules and regulations with no proper co-ordination among themselves. Landfill crossed its estimated life by almost 7 years and was currently operating more as an open dump site than a landfill. Wastes were being dumped illegally and construction waste was being neglected.	Performance/ Compliance audit	Not available	English
2.	Bhutan	Audit of Medical Waste	2008	There was no record on the composition and the quantities of wastes generated; waste management was being done as a secondary assignment by the hospital staff. There was lack of knowledge and awareness amongst the cleaners and ward persons on the management of medical waste. Autoclaving of waste at hospitals was found to be done in a normal waste containing polythene bag instead of specially designed autoclaving bags. No procedures were in place to deal with complaints and cases related to the Occupational Health/Safety and Hospital Acquired Infections.	Performance/ Compliance audit	Not available	English
3.	India	Management of Waste in India, All India Performance Audit.	2008	The audit showed that there was incomplete data of the different kinds of waste, inadequate risk assessment and lack of policy and strategies for waste management. There were no rules for the management of many kinds of waste and where rules existed, the focus was only on disposal and not on prevention. Also, there was a lack of ownership on waste issues and there were no nodal bodies for implementation and monitoring. Poor compliance to rules was also compounded by weak monitoring.	Performance Audit	http://www.cag.gov.in/	English
4.	India	Bio-medical waste management in Kerala	2007	As of March 2007, only 17 per cent of the identified institutions were brought under the purview of the Rules. It was found that funds allotted for creating infrastructure facilities for waste disposal were not utilised. Audit test check revealed that waste treatment and disposal facilities were either non-existent or inadequate in most of the hospitals. Only one Common Bio-medical Waste Treatment Facility	Performance Audit	http://www.cag.gov.in/	English

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No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				existed against the four required and it was handling waste in excess of its stated capacity leading to improper disposal of waste. Proper monitoring and evaluation mechanism did not exist at Government/ Prescribed Authority/Operator level. As most of the 11,000 MTs of bio-medical waste estimated to be generated in the State annually is being disposed without proper segregation and treatment, there could be disastrous consequences to the health of the people due to possible contamination of the environment by toxic and infectious waste.			
5.	India	Unfruitful expenditure on biomedical waste management in Punjab	2007	Failure of the Department to utilize autoclave and shredders led to unfruitful expenditure of Rs.1.68 crore. In addition, Rs.48.55 lakh were also spent on lifting of bio-medical waste through private firms.	Compliance Audit	http://www.cag.gov.in/	English
6.	India	Performance audit of four major Public Hospitals in Delhi, Management of bio medical wastes.	2006	The management and handling of bio-medical waste in the hospitals was deficient. There was lack of proper segregation and handling of bio-medical waste in contravention of the Bio-Medical Waste Rules 1998, thereby increasing risk of infection.	Performance Audit	http://www.cag.gov.in/	English
7.	India	Solid Waste Management by Municipalities and Corporations in Tamil Nadu.	2006	98 <i>per cent</i> of the municipalities had not set up the required waste disposal and treatment facilities even two years after the due date. As a result, solid waste generated was being transported to dumping sites without any treatment.	Performance Audit	http://www.cag.gov.in/	English
8.	India	Compliance with Environmental Regulations by State public sector undertakings in Tamil Nadu.	2005	The disposal of natural wastes/effluent into the atmosphere/water from the cement plant, sugar industries and TPS was identified as a major source of pollution.	Performance Audit	http://www.cag.gov.in/	English
9.	India	Environment Management Systems including the energy conservation at state owned enterprises in West Bengal.	2005	There was a significant gap between the requirement and achievement, leading to pollution in excess of the norms, thereby adversely affecting the health of all life forms. Installation of pollution abatement measures were inordinately deferred or delayed. Adoption of cleaner and safer technology was not envisaged even when the compliance requirements were made progressively more stringent.	Performance Audit	http://www.cag.gov.in/	English
10.	India	Implementation of Pollution Control	2005	The Company has failed to take remedial measures to avoid pollution by dumping of solid waste in an unscientific manner.	Performance Audit	http://www.cag.gov.in/	English

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No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
		measures in Mysore Paper Mills Limited and the Mysore Sugar Company Limited, Karnataka.					
11.	India	Ineffective bio-medical waste management in Orissa.	2005	Only 14 out of the 156 hospitals were given the authorisation by the State Pollution Control Board to operate the biomedical waste management facility. The hospital bio-medical waste management system was yet to come up.	Performance Audit	http://www.cag.gov.in/	English
12.	India	Bio-Medical Waste Management in Jammu and Kashmir.	2004	To avoid infections, injury and adverse impact on environment, hospital waste was to be disposed off scientifically. It was observed that in four hospitals waste was dumped in open pits, hospital lawns or in open land thereby exposing people to health risks.	Performance Audit	http://www.cag.gov.in/	English
13.	India	Non compliance to Municipal Solid Waste Rules and unsafe disposal of bio-medical waste in Rajasthan.	2004	There was improper collection and non-segregation of municipal solid waste, collection/storage of municipal solid waste in open spaces, improper and inadequate transportation of municipal solid waste and non-establishment of authorized landfill sites resulting in unauthorized dumping of municipal solid waste causing environmental pollution.	Performance Audit	http://www.cag.gov.in/	English
14.	India	Construction of outfall drains in rural villages in Delhi.	2004	Only 94 out of 191 rural villages had outfall drains. MCD constructed only 77.84 kms of drains during 1998-2004 against the target of 197 kms. Expenditure of Rs. 1.69 crore incurred on construction of 11 drains in Narela zone was rendered unfruitful as they were not connected to the main drains. Failure to provide outfall drains led to stagnation of water and exposed the residents to health hazards from stagnating sewage.	Performance Audit	http://www.cag.gov.in/	English
15.	India	Improper disposal of biomedical waste by medical establishments in West Bengal.	2001	Municipal Corporations did not monitor disposal of hazardous biomedical waste in unhygienic manner by the clinical establishments, causing serious health hazards and pollution.	Compliance Audit	http://www.cag.gov.in/	English
16.	Japan	Project to upgrade waste disposal facilities	2006	The objectivities of subsidies for a project to upgrade waste disposal facilities were not achieved because an ash melting facility which had been upgraded under the project was left out of order due to improper maintenance and inappropriate administration.(1 case; 3.20 million yen).	Performance Audit	Not available	English (summary) Japanese (full text)

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No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
17.	Kuwait	Report on solid waste management audit	2004	Make sure of compliance with environmental standards and regulations related to site management and designs through visiting open and closed landfill sites. Analyze rehabilitation strategy of closed landfill sites that are included in the Tripartite Commission achievements for the initial landfills rehabilitation. Analyze Kuwait Municipality strategy of solid waste management by analyzing the municipalities plan effectiveness and efficiency and the applied procedures to implement its strategy. Conduct questionnaires to sites workers.	Performance Audit	Not available	Arabic
18.	Kuwait	Environmental audit on asbestos waste management	2004	Evaluate the State strategy efficiency in dealing with hazardous waste, hazardous waste sites efficiency and the compliance with environment regulations in dealing with asbestos waste. The performed audit resulted in finding out that there was lack of compliance with the environment standards and regulations that should be followed when dealing with asbestos waste.	Performance Audit	Not available	Arabic
19.	Malaysia	Enforcement Activities for Schedule Waste	2007	Sufficient rules and regulations are in place to govern the enforcement activities of schedule waste. However, the implementation of the enforcement activities is still lacking. This is due to shortage of manpower and vehicles.	Performance Audit	www.audit.gov.my	Synopsis (English)
20.	Malaysia	Management of Clinical Waste at Hospitals and Health Clinics	2007	The Ministry had spent RM131.40 million for the management of clinical waste from 2005 to 2007. Among the weaknesses highlighted include clinical waste was thrown into bins containing domestic waste, the disposal bin were not properly washed, the vehicles for transfers the clinical waste did not have licenses from the Department of Environment.	Performance Audit	www.audit.gov.my	Synopsis (English)
21.	Malaysia	Privatization on Solid Waste	2006	It was found that the management of solid waste in the Federal Territory of Kuala Lumpur and Putrajaya regions was not carried out efficiently in accordance with the objectives of the privatization.	Performance Audit	www.audit.gov.my	Bahasa Malaysia
22.	Malaysia	Nilai Municipal Council-Privatization of Cleaning Services & Disposal of Social Waste	2006	Several weaknesses found in the privatization and cleaning services and disposal of solid waste which include feasibility study on the appropriateness of the privatization projects was not conducted and services charges amounting to RM 17.15 million were not paid.	Performance Audit	www.audit.gov.my	Bahasa Malaysia

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No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
23.	New Zealand	Waste management planning by territorial authorities	2007	The audit reviewed solid waste management planning by territorial local authorities. We also considered three case studies looking at particular approaches to managing solid waste.	Performance Audit	http://www.oag.govt.nz/2007/waste-management/	English
24.	Pakistan	Environment Audit Report on Kasur tanneries pollution control project Govt of Punjab	2003	Evacuation of stagnant spread over 400 acres of land has been achieved. The common effluent pre-treatment plant has been able to remove all the hazardous impurities from the tanneries' waste water except the sulphide content. Appropriate level of control has been exercised over the harmful solid waste and water waste from the tanneries. The new silica-based environment friendly pre-tanning leather technology has not been introduced by the project. The process is highly electricity intensive leading to high treatment cost.	Performance Audit	Nil	English
25.	Saudi Arabia	Performance assessment of measures related to disposal of medical wastes	2008	There was a failure to enforce the role of monitoring and inspection of medical wastes, where the audit showed that an inspection committee was not created to inspect violation of the unified law for medical wastes. There was lack of a database on medical wastes. Some health facilities did not send statistical data and reports on medical wastes (stored and treated quantities) to the concerned department. Inspection tours of some hospitals and clinics revealed that employees in this area have little awareness of the danger of medical wastes, where medical and non-medical wastes are collected together. Transporting hazardous medical and non-medical wastes to the collection point of municipality in containers not designed for hazardous medical wastes. Medical waste storage rooms did not comply with the standards.	Performance Audit	In coordination with the officer via the link: www.qab.gov.sa	Arabic
26.	Saudi Arabia	Performance audit of a public hospital in the field of medical wastes	2008	Hazardous and non-hazardous medical wastes were not separated, which is in violation of the rules of implementation of the uniform regulations for the management of medical wastes in GCC countries. Non-disposal of some hazardous chemical wastes at the departments of anatomy and pharmacology, which were not being kept safely in violation of medical waste treatment law. Medical waste collection (storage) rooms in suites and corridors not meeting environmental requirements and standards. Ordinary	Performance Audit	In coordination with the officer via the link: www.qab.gov.sa	Arabic

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No.	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				containers were used for sharp devices and liquids in blood bank laboratory. No labels were put on hazardous medical waste bags. There was absence of awareness role of the committee, set up to deal with medical wastes at hospital, regarding the ways of disposing of, storing and dealing with medical wastes.			
27.	Turkey	Waste Management in Turkey - National Regulations and Evaluation of Implementation Results	2007	Despite the fact that legal arrangement and other national plans and programs form a sound basis for waste management strategy; a strategy paper has not yet been prepared. There is no sufficient cooperation and coordination among the institutions and organizations, especially the municipalities. It is understood that a mechanism to meet the necessity of high quality data, which is of great importance in the formulation and implementation of waste management policies has not been established as yet. The municipalities deal solely with waste collection and shipment and these services are outsourced to private companies, there exists no arrangement for waste management in their administrative structure. The municipalities do not have resources to afford the costs and no tools such as taxes or fees through which they can cover waste management costs from the polluters in accordance with the "polluter pays" principle which is also added to the legislation. Monitoring and control activities of the Ministry have remained at a very limited level and generally resulted in no sanction. The separation at source and recycling activities are conducted at a very low level.	Performance Audit	http://www.sayistay.gov.tr/english_tca/Performance/TCA_Waste_Management_Report.pdf http://www.sayistay.gov.tr/rapor/PerformansRapor.asp	Turkish/English

Annex 2

Database of Environment Audit reports relating to Air issues in ASOSAI nations

No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
1.	Australia	The Administration of Major Programs	2003/ 2004	The objective of the audit was to examine and report on the administration, efficiency and effectiveness of seven major programs administered by the Australian Greenhouse Office.	Performance Audit	www.anao.gov.au/publications/environmentandheritage	English
2.	India	Pollution Control by Transport Department, Mizoram.	2006	Failure on the part of Government to arrange apparatus for emission test not only resulted in plying of 49,826 vehicles without 'pollution under control certificate' during the years 2004-05 and 2005-06, but also led to loss of revenue of Rs. 2.99 crore. Besides, there was also an attendant risk of environment pollution.	Compliance Audit	http://www.cag.gov.in/	English
3.	India	Environmental Management System in State Public Sector undertakings in Uttar Pradesh.	2005	Environment Management System did not exist in any public sector undertakings (PSUs). PSUs failed to comply with many of the statutory provisions on air, water and solid waste management and handling of hazardous waste.	Performance Audit	http://www.cag.gov.in/	English
4.	India	Environment Management System in thermal power stations of the Gujarat Electricity Board.	2005	Audit found that there was emission of excessive air pollutants, discharge of excess water pollutants, delay in construction of silos for dry ash handling and delay in augmentation of ash handling system in the thermal power stations of the Gujarat Electricity Board, leading to pollution.	Performance Audit	http://www.cag.gov.in/	English
5.	India	Ineffective pollution control in Thermal Power Stations of Bihar State Electricity Board.	2005	The infrastructure for controlling pollution was inadequate. Facilities to test suspended particulate matter and flue gases emission were inadequate and hence emission checks were not of the desired frequency.	Performance Audit	http://www.cag.gov.in/	English
6.	India	Environmental Safeguards in thermal power stations of Andhra Pradesh Power Generation Corporation Limited.	2005	The Company failed to comply with the rules and regulations which govern the policy/procedures for environmental protection. Pollution control measures and programmes for conservation and utilisation of energy, water and other natural resources were not followed effectively.	Performance Audit	http://www.cag.gov.in/	English
7.	India	Air Pollution/Vehicular/Industries in 23 States.	2002	Poor implementation and monitoring of the Act in the 23 states of India led to increase in air pollution levels.	Performance Audit	http://www.cag.gov.in/	English
8.	Japan	Project for Carbon	2005	The objectives of subsidies for a carbon dioxide emissions	Performance	Not available	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
		dioxide emissions control		control project were not achieved. Because the generated output by the small wind-power generator installed was less than electricity consumed, carbon-dioxide emissions were not reduced. (1 case; 185.00 million yen)	Audit		(summary) Japanese (full text)
9.	Korea	Environmental audit on air quality improvement projects: Control of Diesel Emissions	2007	The audit was to carry out an in-depth analysis of appropriateness of the master plan, performance, follow-up management for the diesel emission control plan which will require a multi-year budget worth USD 4.7 billion from 2005 to 2014, and to suggest possible solutions to improve air quality in the Metropolitan area.	Performance Audit	Not available	Korean & English
10.	Kuwait	Environment audit on Ali Alsalem Area (Um Alhaiman)	2006	Evaluate the previous studies that were prepared to assess the environment status in this area and surrounding industrial areas. Confirm the air quality in this area based on the environment standards issued by the Environment Public Authority. Evaluate risk that may affect the health of people living in this area. Confirm the environment status management efficiency in the area by assessing procedures applied by the relevant entities to solve the area air pollution.	Performance Audit	Not available	Arabic
11.	Saudi Arabia	Performance Audit of a power generation company in the field of environment preservation	2008	The company has not installed equipment and monitoring systems to measure and monitor toxic gas emissions (sulphur oxide, nitrogen, carbon monoxide, solid particles), from fuel burning. There was lack of an interim plan to rectify the company's environmental situation and lack of an approved environmental vision/policy, delaying the improvement of the company's environmental situation. There were also limited authorities of company's Environmental Protection Department (EPD). Their tasks are restricted to preparing, issuing and updating rules and regulations, while environmental inspectors belong to another department (industrial security), thwarting environmental efforts. No environmental certificates were issued by Presidency of Meteorology and Environment to the power plants, neither were studies conducted to assess the environmental impact of future plants. No emergency plans for potential environmental disasters were in place. There was need to rewrite instructions and procedures guide for environment protection and there was no active role for the EPD. They did not proceed to carry out their duties as per the guide until the	Performance Audit	In coordination with the officer via the link: www.gab.gov.sa	Arabic

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				date of audit.			
12.	Saudi Arabia	Performance audit of an environmental protection department in the industrial zone	2006	Environmental fines law not enforced against companies and factories in violation of environmental standards causing some not to comply with and respond to the EPD instructions. There was rising offensive and harmful gas emissions from industrial operations at a company making water insulators. The company that treats hazardous and non-hazardous industrial wastes failed to meet environmental standards of storage operations and chimney tests. There was rising gas emissions from an industrial waste treatment plant affiliated with the treatment company, as well as hazardous chemicals, e.g., benzene, ethyl benzene, toluene and xylenes. There was low chlorine in treated irrigation water, which is in violation of environmental standards and there was long-standing failure of air pollutant- measuring instruments and communication devices, including devices used for highly dangerous volatile organic materials.	Performance Audit	In coordination with the officer via the link: www.qab.gov.sa	Arabic
13.	Saudi Arabia	Performance audit of a cement factory	2004	There was lack of devices to measure emissions from bypass furnaces, clinker coolers and mills, which were in violation of environmental standards. There was also lack of environmental reports on measurement of emissions from furnaces, bypass dust, clinker coolers and mills. Non-disposal of bypass dust by the factory took place in an environmentally safe way. There was lack of an environmental officer to supervise environmental work at the factory. There was use of internationally banned asbestos shades for parking lots.	Performance Audit	In coordination with the officer via the link: www.qab.gov.sa	Arabic

Annex 3

Database of Environment Audit reports relating to Water pollution issues in ASOSAI nations

No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
1.	China	Water pollution prevention and control funds in key rivers.	2004	Audit findings indicate that, over the past three years since the implementation of the 10th Five-Year Plan, governments at various levels located in the four key river basins have carefully implemented their responsibilities for environment quality in accordance with requirements included in the 10th Five-Year Plan and the State Council replies. They have also taken effective measures and actively raised funds, achieving initial results in the treatment of water pollution in key river basins. However, audit findings also indicate that there still exist some malpractices in the construction and operation of projects, as well as the use and management of funds that are yet to be corrected and solved.	Performance Audit	www.cnao.gov.cn/main/articleshow_ArticleID_962.htm	English
2.	Cyprus	Marine pollution from ships - Joint Report based on national audits 2000 - 2003	2006	There were inadequate reception facilities at ports and insufficient supervision and inspection of ships by the Maritime Authority.	Compliance Audit	Available on website of project coordinator (Netherlands's SAI) www.rekenkamer.nl	English
3.	India	Environmental Management by Mumbai Port Trust, India.	2007	The Port did not have a systematic documented environmental management plan and did not conduct environmental management audits. The Port's pollution control cell was not adequately equipped. The port also failed to control pollution of harbour waters.	Performance Audit	http://www.cag.gov.in/	English
4.	India	Audit of Water Management System in Delhi	2007	Delhi Jal Board (DJB) has been struggling to cope with the increasing demand for water supply. Most of its projects for augmentation of water production capacity and rationalization of water distribution in different parts of Delhi have fallen behind schedule compounding the problem of water shortage in the National Capital. The leak detection management system is inefficient and results in loss of substantial water from the transmission and distribution network. More than 50 per cent of the water supplied does not fetch any revenue for the Government and the satisfaction level of Resident Welfare Associations about the quantity and quality of water supplied is very low. DJB has not formulated any comprehensive policy or plan for regulating exploitation of ground water in Delhi.	Performance Audit	http://www.cag.gov.in/	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				The projects for recycling of waste water have also not been commissioned as planned.			
5.	India	Conservation and Management of Dal Lake in Jammu and Kashmir.	2006	Despite incurring of huge expenditure on various activities connected with the development of the Lake, no appreciable improvement could be discerned in the overall health of the Lake in its conservation, as well as rehabilitation of the people. Problems like excessive weed growth, direct discharge of sewage/nutrients into the lake body, deposition of silt and encroachments, which are the main contributory factors for its degradation, have remained unresolved.	Performance Audit	http://www.cag.gov.in/	English
6.	India	Performance Audit of Arsenic Alleviation Programme in West Bengal.	2005	The schemes for arsenic alleviation were not executed in a mission mode as warranted by the situation and there was inadequate monitoring. Despite 11 years' effort and expenditure of Rs 721.24 crore on arsenic alleviation measures, only 43 per cent of the at risk population was supplied with arsenic safe drinking water as of March 2005 against the capacity created to cover 56 per cent.	Performance Audit	http://www.cag.gov.in/	English
7.	India	Unfruitful expenditure in cleaning up Ooty Lake in Tamil Nadu.	2004	Defective execution of works for augmentation of the sewerage system and its poor maintenance defeated the objective of prevention of pollution of Ooty lake despite expenditure of Rs.12.45 crore.	Compliance Audit	http://www.cag.gov.in/	English
8.	India	Management of projects relating to utilisation and conservation of soil and water undertaken by institutes of Indian Council of Agricultural Research.	2004	Audit revealed that objectives of the projects undertaken were not achieved, there was improper maintenance of national register of soil series and there was non-documentation of traditional wisdom.	Performance Audit	http://www.cag.gov.in/	English
9.	India	Measures to control pollution in the river Yamuna in Delhi.	2004	Despite over ten years of efforts and expenditure of Rs.872 crore since 1991 on establishment of sewage treatment infrastructure for treatment of domestic and industrial sewage before its release into the river Yamuna, the quality of water at the point where the river leaves Delhi has deteriorated drastically with large amounts of untreated sewage still falling into the river.	Performance Audit	http://www.cag.gov.in/	English
10.	India	Sewerage and Sanitation schemes including	2004	None of the ongoing and new sewerage/ sanitation schemes had been completed. Time schedule for completion of works	Performance Audit	http://www.cag.gov.in/	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
		Yamuna Action Plan in Haryana.		was not fixed and funds were not released by Government, which resulted in non-completion of sewerage schemes. This led to spread of unhygienic conditions due to discharge of untreated sewage in the open. There was non-achievement of goals of reducing water pollution in rivers/canals and providing hygienic sanitary conditions.			
11.	India	Implementation of Environmental Acts relating to Water Pollution in India.	2001	A major failure of State Pollution Control Boards was in regulating and controlling the discharge of industrial effluents and domestic sewage into water bodies. Local bodies in the States discharged untreated domestic waste into the water bodies due to inadequate sewerage system and sewage treatment plants. Consequently, the water quality of the rivers continued to deteriorate in terms of Bio-Chemical Oxygen Demand and total coli form. The drinking water supplied to big towns in various States did not conform to the fixed parameters.	Performance Audit	http://www.cag.gov.in/	English
12.	India	Sewage Treatment Schemes in Calcutta Metropolitan area (under Ganga Action Plan) West Bengal.	2001	Implementation of the Ganga Action Plan to control the pollution of river Ganga suffered from faulty planning and delay in execution. Towns were selected on the basis of unrealistic assessment of sewage and as a result pollution load draining into the Ganga was not adequately covered in the scheme. Progress of work was hampered due to absence of monitoring, delay in finalization of tenders and in arranging land.	Performance Audit	http://www.cag.gov.in/	English
13.	Japan	Erosion control project	2004	Regarding an erosion control project, when the protection work of the base of a multistage embankment with iron-wire baskets was designed and installed, the separation of the iron-wire baskets from the multistage embankment was not specified in the design documents and the contractor connected both using coils. Therefore, the design and construction were improper, which resulted in the possibility that the stability of the embankment could be damaged and that the purpose of the work was not attained. (1 case; 5.2 million yen)	Compliance Audit	Not available	English (summary) Japanese (full text)
14.	Japan	Measures to Protect Against Tsunamis and High Tides in Coastal Projects	2004	According to our audit of measures to protect against tsunamis and high tides, about 80% of the municipalities in Japan have not produced a tsunami hazard map and 97% have not prepared a high tide hazard map. In the areas that need the	Performance Audit	Not available	English (summary) Japanese

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				strengthening of measures to protect these areas against the anticipated Tokai earthquake, many municipalities have still not made hazard maps, even though some embankments in the municipalities are not sufficiently high or earthquake-resistant. In addition, some municipalities have not properly established a system of keeping a coastal register to assess conditions of coastal preserved areas or a system of closing the gates at the openings of coastal protection facilities. Therefore, the improvement of coastal protection facilities will still require a lot of time and considerable expense.			(full text)
15.	Japan	Project to maintain water and soil preservation forestry	2006	The objectives of a project to maintain water and soil preservation forestry were not achieved in a installation work of earth retaining structures in a gulch, because impacts of the gulch stream on the earth retaining structures had not been considered sufficiently when designing the structures. Due to this improper designing, stability of the earth retaining structures might be damaged. (1 case; 2.02 million yen)	Performance Audit	Not available	English (summary) Japanese (full text)
16.	Korea	Prevention of Marine pollution	2006	Despite the Korean government's continuous efforts to keep the sea clean, marine contamination has not been mitigated at all. Therefore, the audit was carried out to identify problems in pursuing marine pollution prevention and to present appropriate solutions to the problems found.	Performance Audit	http://english.bai.go.kr/	Korean & English
17.	Korea	Status of Water Quality Management around Four Rivers	2001	The BAI audited a comprehensive plan to improve the water quality around the valleys of four major rivers. The audit results of the investment management show the importance of good policy formation and a sound foundation of investment plans to fulfill effective government investment.	Performance Audit	http://english.bai.go.kr/	Korean & English
18.	Kuwait	Audit of liquid waste drainage in the sea.	2008	Audit studies of conditions and standards set by the Environment Public Authority for the liquid wastes. Compare measurements results with the set standards prepared by the Environment Public Authority. Conduct site visits to laboratories in Al-Suaiba area. Confirm application conditions and standards of liquid waste drainage in the sea that are set by the Environment Public Authority. Make sure that the available devices comply with the international standards and they are sufficient to measure and monitor the environment. Confirm the Environment Public Authority audit efficiency performed on liquid wastes drainage, as the Environment	Performance Audit	Not available	Arabic

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				Protection Centre is attached to the Authority in June 2001.			
19.	Saudi Arabia	Assessing environmental impacts from wastewater treatment plants		No environmental assessment studies were conducted neither were environmental controls and procedures established in wastewater treatment plants. Some wastewater treatment plants are located in urban communities. No emergency plans were drawn up to face environmental crises and pollution risks in accordance with local environmental standards. Some departments have drained hazardous and contaminated industrial pre-treated water into the wastewater system and treatment plants in violation of the technical requirements of treatment. Labs failed to conduct all the required tests on water samples (input & output) from the treatment plant to ensure compliance with technical requirements.	Performance Audit	In coordination with the officer via the link: www.gab.gov.sa	Arabic
20.	Saudi Arabia	Performance audit of desalination water plant in the field of environment	2008	Failure of the desalination department to rectify the environmental situations at the plant within the deadline set in the general environmental law. The contract to remove sulphur gases from plant boilers exhaust had expired for nearly three months. Gas emissions from some plants are on the rise. There are increasing environmental problems as a result of oil leakage into the seawater. Water used in washing boilers and air heaters continued to be drained into a hole within the plant, in violation of environmental standards. Draining washing water of reverse osmosis filters into seawater. Failure to maintain the rubber barrier of water outlet at the plant. The contractor responsible to dispose of carbon ash had no environmental qualification certificate, which is in violation of the environmental law. Failure to follow up transportation and disposal of medical wastes. The current structure of the environmental department at the plant is ineffective and inefficient.	Performance Audit	In coordination with the officer via the link: www.gab.gov.sa	Arabic
21.	Thailand	Audit on the Coastal Erosion Management and Protection	2008	The Department in charge did not use Strategic Environment Assessment (SEA) as a tool in selecting measures and guidance for decreasing and mitigating the coastal erosion problem. There was overlap between related entities about the area surveying and the studying of protection and problem solving. The work performance did not achieve the target and objectives.	Performance and Compliance Audit	Not available	Thai

Annex 4

Database of Environment Audit reports relating to Biodiversity in ASOSAI nations

No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
1.	Australia	The Conservation and Protection of National Threatened Species and Ecological Communities	2006/ 2007	The objective of the audit was to assess and report on the administration of the Act by the Department of Environment and Water Resources in terms of protecting and conserving threatened species and threatened ecological communities in Australia.	Performance Audit	www.anao.gov.au/publications/environment_and_heritage	English
2.	Australia	Commonwealth Management of the Great Barrier Reef Follow-up Audit	2003/ 2004	The follow-up audit was to assess the extent to which the Great Barrier Reef Marine Park Authority has implemented the recommendations of an earlier audit (ANAO Audit Report No. 33, 1997-98).	Performance Audit	www.anao.gov.au/publications/environment_and_heritage	English
3.	Azerbaijan	Audit of use of resources allocated from state budget to the Ministry of Ecology and National Resources in 2002-2005 years in connection with increasing biological resources and protection of water resources of country.	2006	Generally, allocated resources are not sufficient for effective fishing activity. In some fish breeding plants, technological processes were becoming obsolete and production potentials were decreasing. It was proposed the necessity of preparing and approving "State Programme" on management, increased protection and use of sturgeon storing in the Republic of Azerbaijan.	Financial Audit	www.ach.gov.az	Azerbaijan
4.	Azerbaijan	Measures towards the protection and preserve and restoration and rational use of sturgeon.	2006	It was observed that the ecological resources of Caspian Sea (sturgeon) were decreasing sharply. The resources allocated to their protection, preservation and rational use were not used effectively enough. It specified signing Intergovernmental Agreement in this sphere.	Financial Audit	www.ach.gov.az	Azerbaijan
5.	Bangladesh	Conservation of nature and Biodiversity of St. Martins Island and Development of Tourism Industry.	2007	Despite being an ecologically critical area, the government still lacks control over the land. Physical infrastructure has been constructed without the clearance from Department of Environment. Proper sanitation, sewerage and waste management system is absent resulting in pollution of potable water source. Uncontrolled tree felling resulted in habitat destruction, degradation of breeding and reproduction environment of the island's wildlife and biodiversity.	Performance Audit	Not available	Bengali

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
6.	Bhutan	Audit of National Parks	2008	There was minimal Integration of plans amongst parks, districts and sub-division administration levels, lack of impact assessment of park activities, no proper zoning of parks was being carried out and there were inconsistencies in the concepts of zoning among the parks. There was no uniform and consistent approach towards environmental awareness and conflict in balancing the activities between conservation and development.	Performance/ Compliance audit	Not available	English
7.	China	Audit Investigation on the Use of Funds for Environmental Protection of the Qinghai-Tibet Railway.	2005	The audit and investigation findings indicate that in the construction of the Qinghai-Tibet Railway, the relevant departments strictly observed the environmental laws and regulations, stepped up environmental administration, publicity and education and supervision and checking. They also managed and used the fund for environmental protection in accordance with the requirements of the financial regime and fulfilled the tasks of environmental protection in an all-round and effective way. However, construction of the Qinghai-Tibet Railway is undertaken under very special natural conditions and strict demands have been set on its environmental protection work. Moreover, this work is arduous and difficult and there is a lack of experience, so in some respects there remains imperfection.	Performance Audit	www.cnao.gov.cn/main/articleshow_ArtID_921.htm	English
8.	China	Natural Forest Resource Protection Project.	2006	The audit findings indicated that the State Forestry Administration played a role of organization, coordination, direction and supervision in the implementation of the Tianbao Project in accordance with the Implementation Plan. The governments of eight provinces made their efforts in enhancing project fund management, speeding up the construction of ecological and public beneficial forests, clarifying responsibilities for forest resource management and preservation and promoting relocation and resettlement of surplus staff in forestry enterprises. The progress of the Tianbao Project proceeded smoothly as a whole. The audit findings disclosed that due to time pressure in drafting the Implementation Plan, the long duration of project implementation and other reasons, there are some problems to be corrected and improved in using project fund, facilitating the development of forestry enterprises, raising income of the staff and ensuring the security of the forestry	Performance Audit	www.cnao.gov.cn/main/articleshow_ArtID_986.htm	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				resources.			
9.	India	Irregular retention of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funds in the Consolidated Fund of Gujarat and resultant loss of interest	2007	Failure to credit the amounts realised towards Net Present Value of forest land in fixed deposits resulted in irregular retention of CAMPA funds of Rs.39.79 crore in the Consolidated Fund of the Gujarat for periods ranging from 30 months to 36 months and loss of interest of Rs.3.03 crore.	Compliance Audit	http://www.cag.gov.in/	English
10.	India	Implementation of Forest Conservation Act, 1980 in Madhya Pradesh	2007	Forest (Conservation) Act, 1980 was enacted with the objective of maintaining a sustainable balance between the developmental needs of the country and the conservation of natural environment. This objective largely remains unachieved in the State of Madhya Pradesh due to poor implementation of compensatory conservation measures. Not carrying out of conservation measures in large number of cases; non-utilization of funds received from user agencies and failure of significant number of compensatory plantations reflect that the State Government was unable to mitigate the adverse effects of degradation of the environment resulting from diversion of green forests for non-forest purposes and no penal action was initiated by the Government.	Performance Audit	http://www.cag.gov.in/	English
11.	India	Afforestation Programme in Orissa	2007	The afforestation programme aimed at conservation and extension of forests coupled with employment also showed a dismal performance.	Performance Audit	http://www.cag.gov.in/	English
12.	India	Conservation & Protection of Tiger in Tiger Reserves in India, All India Report.	2006	15 out of the 28 Tiger Reserves created had area less than half the prescribed area which was not conducive for conservation, protection and sustenance of a viable tiger population. Relocation of the people living within the Tiger Reserves as well as removal and prevention of encroachment was essential to ease the biotic pressure on the tiger population. The personnel actually employed were also found to be overage, under-trained and under-equipped in many cases. The intelligence and communication network at the Reserves level was also weak. Many tiger reserves neither prepared the tourist management plans nor assessed the tourist carrying capacity of the reserves.	Performance Audit	http://www.cag.gov.in/	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
13.	India	Illicit felling and removal of timber in Meghalaya.	2006	Under the Assam Forest Regulation, 1891 and Rules framed there under (as adopted by Government of Meghalaya), felling and removal of trees from the reserved forest area, without valid pass, constitutes a forest offence punishable with fine. Forest produce felled/removed illegally is also liable to be seized by the Forest Department. Loss of revenue of Rs. 35.93 lakh took place due to illicit removal of 754.760 cum of timber from State reserved forest.	Performance Audit	http://www.cag.gov.in/	English
14.	India	National Parks including Wildlife Preservation in Himachal Pradesh.	2006	The objectives of protecting, developing and scientifically managing wildlife in the protected areas was not fully achieved due to the inability of the department to tackle the problems of biotic and human interference in the protected areas. Regular census of all the animals and birds in the wildlife area had not been conducted.	Performance Audit	http://www.cag.gov.in/	English
15.	India	Conservation of Wildlife in National Parks and Sanctuaries in Chhattisgarh.	2006	The objective of conserving wildlife and its habitat was accorded very low priority. There was limited communication network and anti-poaching operations were largely neglected. Forest guards were untrained and old and the wildlife population had also shown a steep decline.	Performance Audit	http://www.cag.gov.in/	English
16.	India	Wildlife preservation under Centrally sponsored scheme, Arunachal Pradesh.	2006	The objective of preservation of wildlife in accordance with the Wild Life Protection Act, 1972 and National Wild Life Action Plan (NWLAP) 2002-16 was not achieved in Arunachal Pradesh in full due to the absence of financial control, delay in formulation of Management Plans, State Government's inability to tackle the encroachment problems and lack of planning and prioritization of preservation/conservation measures.	Performance Audit	http://www.cag.gov.in/	English
17.	India	Environment audit of government companies in Himachal Pradesh.	2005	Environment Management System did not exist in any government company. Monitoring guidelines of Government of India in regard to compensatory afforestation and dumping muck and debris were not followed.	Performance Audit	http://www.cag.gov.in/	English
18.	India	Functioning of the Forest Department in Andhra Pradesh.	2004	A review on the functioning of the Department revealed that there were abnormal delays in the implementation of Compensatory Afforestation schemes and the department failed to arrest encroachments in the wildlife sanctuary at Kolleru Lake.	Performance Audit	http://www.cag.gov.in/	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
19.	India	Zoological Survey of India.	2002	Zoological Survey of India, ZSI failed to fulfil its primary objectives in the areas of exploration and survey of 'faunal' resources, taxonomic studies, status survey of endangered species. An aquarium planned for operation by 1990 for educational and recreational purposes was yet to be established even after a lapse more than 10 years. There were instances of costly equipment either lying idle or being underutilized.	Performance audit	http://www.cag.gov.in/	English
20.	India	Madhya Pradesh Forest Development through World Bank aided Madhya Pradesh Forestry Project.	2002	Significant progress towards Joint Forest Management could not be achieved, as local people were not effectively involved. The Forest Survey of India (FSI) reported a significant reduction of 13534 sq. km in dense forest cover in Madhya Pradesh between 1995-99.	Performance Audit	http://www.cag.gov.in/	English
21.	India	Functioning of Zoos and Wildlife Sanctuaries, Rajasthan.	2002	India Eco-Development Project was lagging behind on account of improper planning. Zoos and sanctuaries were not managed as per provisions of Act and rules framed there under. There was also inadequate protection staff, lack of arms and means of communication. No evaluation/ research of offences to improve conviction were conducted.	Performance Audit	http://www.cag.gov.in/	English
22.	Japan	Comprehensive Project for Promoting Cooperation Between Cultivation and Stockbreeding and the Recycling of Resources	2004	Regarding a comprehensive project for promoting cooperation between cultivation, stockbreeding and the recycling of resources, the design and construction were improper. For example, measures to prevent cracking were not devised when the concrete floor for the compost house was designed; and in 2004, measures to maintain the humidity were not devised when the compost house was constructed. As a result, many cracks appeared on the concrete floor and foul water from the excrement of the farm animals soaked into the underground soil. Thus, the purpose of the subsidy was not attained. (1 case; 15.76 million yen)	Compliance Audit	Not available	English (summary) Japanese (full text)
23.	Japan	Project for forest environment preservation	2006	In submitting requests for the State contributions for a forest environment preservation project, forestry cooperatives falsely applied predetermined multipliers to relevant expenses and added the multiplied amounts based on claims that they were undertaking the project, although the actual undertakers were forest owners who undertook the project either by themselves or by employing other forestry subcontractors. As a result, the subsidies were overpaid. (3	Compliance Audit	Not available	English (summary) Japanese (full text)

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				cases; 87.18 million yen)			
24.	Korea	Environmental audit on Biodiversity	2003	The purpose of audit was to evaluate the results of implementing natural ecosystem conservation policy measures taken by the MOE (Ministry of Environment), including the designation and management of well-preserved ecosystems and protection measures for wild fauna and flora, and to suggest alternatives to address the identified problems, thereby ensuring the effectiveness of natural ecosystem conservation policies and contributing to the improvement of people's quality of life.	Performance Audit	Not available	Korean & English
25.	Korea	Conservation and Management of the Back-Du-Dae-Gan (trans-korea backbone mountain range)	2002	The Baek-Du-Dae-Gan (BDDG), a trans-Korea backbone mountain range, is a main source of most water resources in the Korean peninsula, as well as the home to over 90% of the wildlife. Since the 1990s, however, various development projects such as the construction of dams, mines and tourist resorts have started in this area. These activities might result in long-lasting damage to the ecosystem as well as the wildlife habitats. The Board of Audit and Inspection (BAI), therefore, evaluated related conservation programs of the Ministry of Environment (MOE) and the Korea Forest Service (KFS).	Performance Audit	http://english.bai.go.kr/	Korean & English
26.	Kuwait	Environment Audit on procedures of local poultry safety from salmonella microbe.	2006	Assess the current status of local poultry safety procedures efficiency, the extended efforts to minimize the risk of microbe spreading among the local production and review environment management systems to confirm the appropriateness of the State food safety management systems to reduce the current and future poultry safety risks.	Performance Audit	Not available	Arabic
27.	Malaysia	Department of Fisheries Malaysia - Management and Conservation of Turtle Program	2005	The study showed that several aspects on the operations and management were not carried out in accordance to the guidelines issued by the Fisheries Department.	Performance Audit	www.audit.gov.my	Bahasa Malaysia
28.	Malaysia	Management of Recreational Forest	2005	Among the findings of the study include the unsuitability of the location of selected recreational forest, insufficient information on the promotion strategy, improper maintenance of the forest and lack of enforcement of laws and public safety.	Performance Audit	www.audit.gov.my	Bahasa Malaysia
29.	New Zealand	Dept of Conservation: Planning for and	2006	The Department of Conservation is responsible for about one third of land in New Zealand (conservation areas and national	Performance Audit	http://www.oag.govt.nz/2006/doc-	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
		managing publicly owned land		parks). We assessed the Department's strategic planning for land, and the adequacy of its systems for implementing that planning. The audit recommended that the Department develop a national strategic plan to co-ordinate its management and information systems to achieve long-term objectives.		landholdings/	
30.	New Zealand	Ministry of Agriculture & Forestry: Managing bio-security risks associated with high-risk sea containers	2006	We assessed the Ministry of Agriculture and Forestry's identification, inspection and clearance of those sea containers that pose the highest bio-security risks. We found a number of areas for improvement, including compliance and enforcement with the sea container import health standard, information gathering for risk-profiling purposes, training and guidance for inspectors, checks of the effectiveness of decontamination and guidance for the establishment of equivalent systems.	Performance Audit	http://www.oag.govt.nz/2006/maf/	English
31.	New Zealand	Ministry of Fisheries: Follow up report on information requirements for the sustainable management of fisheries	2005	This was a follow-up audit to a 1999 report, which drew attention to the risks involved in managing New Zealand's fisheries. We were concerned that the Ministry of Fisheries did not have enough information to ensure that the fisheries were being managed in a sustainable way and to their full economic potential. The follow up found good progress against our earlier recommendations.	Performance Audit	http://www.oag.govt.nz/2005/fisheries/	English
32.	New Zealand	Horizons and Otago Regional Councils: Management of freshwater resources	2005	Our audit looked at freshwater management by two regional councils. Our aim was to identify good practice by these 2 councils, or where improvements could be made that would be useful for all regional councils. We found that good progress had been made in planning and implementing water allocation frameworks, but improvements were needed in compliance, effectiveness and efficiency monitoring.	Performance Audit	http://www.oag.govt.nz/2005/water/	English
33.	New Zealand	Department of Conservation: Administration of the Conservation Services Programme - Follow up audit	2005	This was a follow-up to a 2002 report on the administration of the Conservation Services Programme by the Department of Conservation. The programme is funded by levies on the fishing industry to offset the environmental impacts of fishing. The follow up found that most of our earlier recommendations for greater accountability for the programme had been implemented.	Performance Audit	http://www.oag.govt.nz/2005/doc-csp/	English
34.	New Zealand	Department of Conservation:	2002	We conducted an inquiry into the administration of a levy payable by fishers to offset environmental impacts of fishing	Performance Audit	http://www.oag.govt.nz/2002/doc-	English

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
		Administration of the Conservation Services Programme		(the Conservation Services Programme). We found gaps in accountability for the expenditure.		services/	
35.	New Zealand	Ministry of Agriculture and Forestry: Management of Bio-security Risks	2002	The audit looked at the policies and procedures and risk analysis by the Ministry of Agriculture and Forestry to manage bio-security risks. The report supported a companion volume of 7 case studies illustrating policies and procedures in practice.	Performance Audit	http://www.oag.govt.nz/2002/biosecurity/	English
36.	New Zealand	Management of Bio-security Risks: Case Studies	2002	This report contains seven case studies that highlight how departments have managed specific bio-security risks. These case studies illustrate how departments have worked together, and how the policies and procedures of the Bio-security Programme have been applied in relation to specific bio-security risks.	Performance Audit	http://www.oag.govt.nz/2002/biosecurity-case-studies/	English
37.	Pakistan	Impact of Eucalyptus Plantations on the environment under the social forestry project Malakand-Dir	2002	It has been established that although Eucalyptus has been the choice tree species in most of the social forestry projects in the Asia Pacific region due to its fast growth high survival rate, short rotation and wide ecological range, yet in Malakand-Dir region, as in some countries, it registered pronounced deleterious effects on the environment. In social forestry project Malakand-Dir, water shortage has appeared in the project area and dug wells and tube wells are running dry due to lowering of water table.	Performance Audit	Nil	English
38.	Turkey	Planning and Audit of the Coastal Utilization	2006	Due to the lack of upper-scaled guiding plans, healthy plans can hardly be prepared. Data does not exist on which coasts the edge lines, which is the foremost element for planning, are designated. Illegal buildings occupy large segments of the coasts where the land is valuable. It is observed that the institutions in charge of controlling the practices at coasts are in need of personnel competent and well-informed in the field of coastal legislation. The local administrations also have technical problems in overcoming the coastal infringements; cooperation among public institutions cannot be ensured; coastal infringements cannot be corrected due to technical impossibilities at certain regions.	Performance Audit	http://www.sayistay.gov.tr/rapor/PerformansRapor.asp	Turkish/English
39.	Turkey	The Protection of Forests	2004	The legal boundaries of the forests have not been defined in	Performance	http://www.sayistay	Turkish/En

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No	Name of SAI	Paragraph title along with Report title	Year	Gist of audit findings	Type of audit	Web link for the paragraph/report	Language of report
				the national land registry; it is been hard to reverse illegal clearings. Forests, especially those near the economically very active and touristic sites have been cleared in most cases illegally. Identification of areas disqualified from forest is not based on scientific and objective criteria.	Audit	.gov.tr/rapor/PerformansRapor.asp	glish