

Environment and Health International



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COMPENDIUM OF SUSTAINABLE DEVELOPMENT INDICATOR INITIATIVES: A GLOBAL DIRECTORY OF COMPREHENSIVE INDICATOR SYSTEMS

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Paper prepared for presentation at the OECD World Forum on Statistics, Knowledge and Policy June 27-30, 2007 Istanbul, Turkey

Introduction

The need for changing the way we measure progress by adopting sustainable development monitoring and indicator systems has been acknowledged for decades by now. In response to calls by the Brundtland Commission twenty years ago and later Agenda 21, among others, many indicator systems have been developed by international organizations, national governments, local authorities and others, while probably even more of them are being planned (WCED 1987; UN 1992).

The landscape of sustainable development indicator systems that evolved is full of stories of success, but also of continuing major challenges. Indicator systems are key policy tools to operationalize the general concept of sustainable development based on shared but differentiated responsibilities. Indicator systems that help articulate and track progress in fulfilling these responsibilities are fundamental as planning, implementation and evaluation instruments, and also as instruments of communication and coordination across different scales, up to and including the global scale. However, the landscape of indicator efforts is fragmented in terms of types of indicator systems and ways of indicator development and use. It is also fragmented in terms of developed versus developing countries and national versus local or sectoral initiatives. The major risks associated with excessive dominance of economic measurement tools that characterized the post-WWII decades are

increasingly recognized, but the resulting cross-scale mosaic of indicator systems has not consolidated as a coherent picture and as part of a global program of transformation and transition to sustainability.

A key dilemma is that contextualizing indicators creates a fragmented landscape of approaches, while it is essential if one is to ensure indicators are relevant to local audiences. Indicator sets are compiled based on geographic regions with natural or jurisdictional boundaries, economic sectors and institutions, in many countries of the world. Over the years many coordination initiatives were started that aimed at building coherence. Some of these focused on identifying common principles, such as the Bellagio Principles (IISD 2007), while others on common frameworks and core indicator sets for countries, groups of countries or sectors (e.g., Eurostat 2007; Montréal Process Liaison Office 2007; OECD 2007; UN-DESA 2007; United Nations 2007). Some of the coordination efforts are aimed only at providing common methodology, while others, such as the indicators for the Millennium Development Goals are strongly associated with policy processes and implementation mechanisms.

Despite these and other coordination efforts there is no general consensus on a more systematic approach to measuring progress and on how to use these measures in policymaking more effectively. Even in cases where there is consensus on the indicators, due to the different priorities or unsystematic design of monitoring efforts in the past, availability and quality of time series data is a major problem. So a lot remains to be done!

In this light you may see the *Compendium on Sustainability Indicators – A global directory for indicator initiatives* as an attempt to bring together experience in one place on best practice on measurement from the global to local level. While the Compendium offers no synthesis and does not by itself offer solutions, it lays bare the facts on parallel indicator systems with the explicit intention of facilitating cross-scale and cross-jurisdictional dialogue and cooperation. As we view the development of sustainable development indicators as part of a long-term social learning process, the Compendium itself is intended to be a long-term, ongoing initiative.

Comprehensive Indicator Systems

As this paper is presented at a session focused on *comprehensive* indicator systems, we need to offer our interpretation of what we mean under

¹ <http://www.iisd.org> ² <http://www.ifeh.org>

‘comprehensive’. Our interpretation is broad, and covers not only the content and structure of indicator sets, but also the way indicators are communicated, used and integrated into decision-making. We believe this broad interpretation of comprehensiveness is aligned with sustainable development. In this sense, comprehensiveness can be considered as a collection of indicator systems criteria that we use as a filter when deciding what initiatives are suitable to include in the Compendium.

We believe comprehensive indicator systems are necessary to navigate the ‘path of sustainability’. Without tools like these the direction of the human enterprise, on whatever scale, risks drifting and being based only on ad-hoc policy measures.

This statement could be rephrased as follows: If you don’t know where you are located and where you are coming from, you won’t be able to define where you are heading and you won’t be able to decide whether you are moving in the right or wrong direction. Navigating change is possible only through the use of a comprehensive indicator system.

The starting point for a comprehensive indicator system is a *conceptual framework* that cuts across key domains of sustainable development, including but not limited to ecological, social, economic and depending on the framework institutional domains. Initiatives listed in the Compendium represent many different types of frameworks, such as those based on pressure-state-response, capital accounting or other categories. In general, we did not encourage listing indicator efforts that focused only on a specific topic, as we believe finding ways to integrate indicator system that often cut across a diverse set of policy areas is at the heart of the sustainability challenge. While thematically different, many of the initiatives reflect the application of common principles such as the Bellagio Principles for measuring and assessing progress towards sustainable development.

Related to the question of conceptual framework, comprehensiveness can also be defined in terms of *relevance* of the indicators for key policy issues. At the highest level a subset of comprehensive indicator systems may be identified as *headline indicators*, which we believe is a good practice in terms of focusing attention on policy priority areas that require close attention.

Recognition of *cross-scale issues* in both the temporal and spatial senses is a key challenge. Most initiatives listed report retrospective time series trends and an increasing number are developing

forward-looking projections, outlooks or scenarios. With regard to the spatial scale, trans-boundary and cross-scale issues are increasingly important e.g., by taking into account the implications of global processes in community level indicator systems.

The *target audience* of indicator systems varies, but it is crucial to make an explicit effort to make indicators that cover public interest issues available to a widest range of social groups, ranging from top decision-makers to the general public in a way that is understandable and transparent. And also it is vital to include public participation in the process of selecting headline issues as well as the specific indicators.

This reflects the perspective represented by the Aarhus Convention³ that point to the importance of:

- Involvement of all key stakeholders and the general public in matters related to the environment and sustainable development;
- Public access to information and supporting data;
- and
- Making information regularly available.

In addition to the above attributes related to indicator initiatives overall, we take the following indicator criteria as central:

From the reading of the indicator values over time one should be able to definitively and objectively conclude whether the changes describe a positive or negative development;

The indicator should be based upon objective data measurements, where the specific data leaves no room for interpretation besides the monitoring inaccuracy;

The indicator must be easy to comprehend and there has to be a recognized causal link between the data the indicator is based upon and the development one wishes to describe; and

The indicator is closely linked to planned targets.

Clearly, the extent to which initiatives listed in the Compendium comply with the rather broad range of attributes listed in this section varies, but they represent an effort to bring attention to efforts that approach sustainability issues in a systemic way.

³ United National Economic Commission for Europe Convention on Access to Information, Public Participation in Decision- Making and Access to Justice in Environmental Matters – done at Aarhus Denmark 25th June 1998

About the Compendium

Over its more than a decade of existence the Compendium evolved from a printed report of IISD⁴ into a web database with over 800 indicator projects listed⁵, making it one of the world's leading information sources on the design and use of comprehensive indicator systems. Intended audience includes primarily indicator practitioners around the world in the public sector, business and civil society. Based on our experience the Compendium is also of considerable interest to the policy research community and the academic sector. Besides IISD's, in kind and financial support for the work came from Environment Canada, the World Bank, the UN Commission for Sustainable Development, Redefining Progress, and more recently the International Federation of Environmental Health (IFEH).

Goals of the Compendium can be summarized as follows:

- improve communication among the various stakeholders in sustainable development to promote the sharing of experiences, methods and approaches on indicator development and use for mutual benefit;
- facilitate the harmonization of indicator development approaches and indicator sets;
- help avoid duplication of efforts and facilitate the integration of monitoring, data analysis and reporting activities;
- provide governments, NGOs, the private sector and the public with access to a pool of experts working on indicator development;
- help identify areas of future research where indicator work is required; and
- provide information on a wide range of publications related to developing indicators and indices for sustainable development.

The Compendium is not targeting any specific indicator system but rather it can be seen as a meta database. Entries listed are not restricted to initiatives adopting the term 'sustainable development indicators', but also include those that operate with other, comparably holistic concepts whether measuring quality of life, ecosystem / human system wellbeing, ecosystem health, genuine wealth or others. By adopting a flexible approach, we sought to demonstrate alternatives to a whole system perspective on environment / development

⁴ Pintér, L., P. Hardi and L. McRorie-Harvey. (1995) *Performance Measurement for Sustainable Development: Compendium of Experts, Initiatives and Publications*. Winnipeg: IISD.

⁵ <http://www.iisd.org/measure/compendium>

interactions, and assuming that the conceptual and methodological challenges were sufficiently similar to offer useful lessons, irrespective of the terminology used.

Access to the information is free and can be queried through a powerful search engine. In order to streamline database maintenance and reduce costs, indicator initiative owners who can also manage their information in order to keep it up to date submit entries. Consistency of the information and quality control is ensured through a part-time administrator at IISD. Although stronger in some regions and sectors than in others, the Compendium provides information on initiatives carried out at international, national, provincial/territorial/state, regional, sectoral, ecosystem and local/community levels worldwide.

Information on indicator initiatives is requested and presented in entries that cover a wide range of indicator system design parameters. These parameters were developed over years through a consultative process among the partner organizations and practitioners involved. The choice of design parameters represents a compromise between the wide range of factors that could be used to characterize indicator efforts and the need to keep the database simple to manage and update. Even with this, there are 36 fields to enter information in, including free text and a selection of predetermined criteria. The Compendium does *not* include indicators themselves, but provides direct links to printed and electronic resources where such information is easily available. More detailed information on base format can be found in Annex 1 of this paper and on the Compendium website itself.

Submission of entries is open to the public through a web interface. In order to complement voluntary submissions, from time to time a special effort was made by IISD to actively search for and request relevant entries to make sure information on key initiatives is not missed. In order to help maintain entries and cut the cost of updates, the Compendium sends automatic periodic requests for update to the email address listed under a given entry with a direct link to the entry's update page.

Review of the 2007 Updates to the Compendium

Since its emergence as a field of practice in the early 1990s, alternative indicators of progress are being developed by an increasing number of organizations. In sharp contrast with earlier years, the number and type of initiatives is now at a point where providing a comprehensive picture of what is happening in the field may no longer be practically possible. Our impression is that the recognition that a fundamental

rethinking of the way we measure progress is necessary is starting to reach the mainstream, and as a result the number of initiatives has started to proliferate.

As part of the effort to keep information on key initiatives in the Compendium as current as possible, a campaign was initiated in early 2007 to identify key recent initiatives not sufficiently represented. The campaign was undertaken by IISD in cooperation with IFEH based on a cooperation agreement signed in 2005 by the two organizations. Since 2000 the International Federation of Environmental Health has been running projects on sustainability indicators initiatives, including the compiling of best practices as well as methodologies. The focus of IFEH's initiative has also been on collecting information on local/regional level indicator efforts from around the world through 37 national environmental health member organizations. IISD and IFEH formed a joint working group and at IFEH the initiative has been named *The IFEH Sustainability Initiative* (IFEH SII). At IISD the work is run through the Measurement and Assessment Program, which in 1995 initiated the work on the Compendium.

In terms of the agreement⁶ the Compendium was introduced to IFEH's global network of 37 national member organizations covering over 60,000 professionals with a request to consider registering their relevant indicator initiatives. In addition, IISD engaged five part-time researchers based in different parts of the world to identify and compile entries on key indicator efforts not currently represented in the Compendium (Annex 3). Both the IFEH request and the work of the researchers were to ensure there is more even representation of indicator initiatives from around the world, including developing countries. The focus of this update was on initiatives in Asia, Africa, Latin America and the Caribbean, United States, and sectoral nodes related to Forestry and Environmental Health. Besides collecting new and updated information, participants also reviewed and amended the structure of the Compendium to better reflect SD indicator initiative design issues. This included adding new selections in pre-existing menus, better explanation of some of the Compendium fields, and fine-tuning the database for ease of use.

A Sampling of Comprehensive Indicator Initiatives in the Compendium

As of early May 2007 the campaign to update the Compendium resulted in 153 largely new, and some updated entries on recent indicator initiatives from around the world. The following is a brief sampling of initiatives recently added that illustrate the spectrum of ongoing work that covers a cross-section of sustainability issues across the environmental and socio-economic domains.

Note not only the diversity of indicators and frameworks, but also the diversity of processes used in selecting and linking them to policy processes. Some of the initiatives here are also noted for their attempt to link to indicator efforts across scale either by adopting higher level framework (e.g., #1) or by trying to influence indicator and assessment work in their wider region (e.g., #3). Attempts like this illustrate that the need for harmonizing the way we measure progress is well recognized and attempts at cross-scale coordination may be having a gradually positive effect.

Example 1: The Changing California - Forest and Range Assessment 2003

This initiative used indicators that have been developed from the Montreal Process suite in conjunction with public and stakeholder consultation on values and priorities within the state. The assessment includes not only the monitoring for each indicator, but an evaluation of the natural-socioeconomic system. This exercise includes identifying challenges in monitoring, setting new goals, implementing new tools to address emerging issues, and continuing to consult with the public and stakeholders. They have depicted the whole integrated system to create a 'management landscape' with GIS. In this landscape map, the conservation, urban, agricultural, and economic values for the whole state are represented and form the basis of the assessment's conceptual framework. It is interesting to note that for a forest and range assessment, the three major categories of this landscape map were land-use, ownership, and housing density- suggesting that managers are looking at the entire landscape, and not parceling the forest areas into impervious units and managing them like closed systems.

⁶ MoU between IFEH and IISD and IFEH Policy on the use of Sustainability indicators

Title of Initiative	The Changing California, Forest and Range 2003 Assessment
Lead Organization(s)	Fire and Resource Assessment Program, California Department of Forestry and Fire Protection
Description of Goal	To provide the California State Board of Forestry and Fire Protection, the public, and other policy makers information on environmental, economic, and social conditions that support forest and rangeland resource sustainability.
Geographic Scope	State/Provincial
Municipality, Province/State	California
Framework for Indicator Set	The FRAP framework is a systematic overview of the status, trends and challenges to California's Forests and Rangelands. It is based on the sustainability indicators and criteria developed by the Montreal Process. These criteria include conservation of biological diversity, maintenance of productive forest functions, maintenance of forest health and vitality, conservation of soil and water, forest contribution to global carbon cycles, maintenance of socioeconomic benefits, and the policy framework needed to foster forest conservation and sustainable forest management.
Progress to date/future areas of work	The Forest and Range 2003 Assessment is the fourth FRAP assessment. The first two assessments (1979 and 1988) were organized by demand, supply, limits, and opportunities in the use of forests and rangelands. In 1995, CDF, under the Board of Forestry's leadership, experimented with framing the Assessment on the most limiting natural factor on forest and rangelands - wildfire. It contained a fiscal, planning, and policy framework and was widely published as the California Fire Plan (1996). The 2003 Assessment goes beyond the California Fire Plan methodology and uses criteria and indicators for sustainable forest management. This project is ongoing and further assessments are forth coming.
Timeframe	Ongoing
Presentation of the information and indicators	An assessment summary and a series of online technical reports are available on the website. The technical reports are broken down according to criteria and reporting for each indicator is available.
Publications	The assessment is web-based. Please see http://www.frap.cdf.ca.gov/assessment2003/
Initiative Locations	UNITED STATES
Contact Person	Dean Cromwell; Robert Motroni
Address	1300 U Street Sacramento, CA 95818 (916)327-3939 Mailing address: CDF Attn: FRAP; PO Box 944246; Sacramento CA 94244-2460
Email	Dean.Cromwell@fire.ca.gov ; Robert.Motroni@fire.ca.gov
Website	http://frap.cdf.ca.gov/
Initiative Types	Other, Criteria and indicators of sustainable forest management
Intended Use Of Initiative	Policy Development, Performance Measurement, Indicator Development, Adaptive Management
Geographic Units	Natural Areas
Issue Areas	Forestry, Other, see "Description of the Framework"
Organization Types	provincial / territorial / state
Mandate Requirement	Legislative
Public Involvement	consultation, evaluation process, public membership on committee
Other Public Involvement	In developing the Assessment, the legislative mandate requires that CDF solicit the cooperation of, and information collected by, public and private organizations, federal forest and rangeland resource
Report Frequency	Periodic
Public Access to Supporting Data	Yes

Example 2: Indicators in South Africa's State of the Environment Report

The National State of Environment (SoE) Report for South Africa provides a comprehensive analysis and report on resource management and environmental issues at a national scale. The initiative is focused on the improvement of the quality of life of all South Africans, by promoting sustainable development; by utilization and protection of their natural and cultural resources; by empowering the South African public, communities and organizations through participation, environmental education, capacity building, research and information services; and, by establishing responsible tourism. Indicators are grouped according to the main issues related to climatic and atmospheric change, sustainability of terrestrial ecosystems, sustainability of water resources, sustainability of coastal and marine systems, social dimension, economic dimension, and political dimension. While this does not cover all sectors, it does cover those that rely heavily and directly on the state and trends of the natural environment.

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The report which is prepared through public involvement consultation and public membership on committee is intended for decision makers, planners, environmental managers, and interest groups from different backgrounds, and for different purposes. In order to make this report useful to as wide an audience as possible, it is also available in Afrikaans, iXhosa, isiZulu, and Tswana.

As part of the State of Environment Reporting Programme initiated by the Department of Environmental Affairs & Tourism, municipal state of the environment reports have been developed for the Cape Metropolitan Area, Durban, Johannesburg, Pretoria Metropolitan Area, North West, Gauteng, Mpumalanga, and KwaZulu-Natal. These provide information on local environmental issues specific to each city, and outline what can be done to enhance sustainable development and use of natural resources at a local level.

The reports are available on the internet; indeed, this report is the first national State of the Environment Report on the internet for South Africa. The initiative provides public access to supporting data.

Title of Initiative	National State of the Environment Report for South Africa
Lead Organization(s)	Department of Environmental Affairs and Tourism
Description of Goal	The National State of Environment (SoE) report is the major mechanism through which resource management and environmental issues are comprehensively reported and analysed on scales that transcend local authority and provincial boundaries. This initiative and its reports are focused on the improvement of the quality of life of all South Africans, by: promoting sustainable development, utilisation and protection of their natural and cultural resources; empowering the South African public, communities and organisations through participation, environmental education, capacity building, research and information services; and, establishing responsible tourism. This initiative was designed for Ministers, decision makers, environmental managers, and planners, who need to know what the state of South Africa's environment is and what the consequences will be from certain policies, projects or actions.
Geographic Scope	National
Partners	CSIR, United Nations Environment Programme (UNEP), Norwegian Research and Development Agency (NORAD), Global Resource Information Database Arendal (GRID), and Uglund Publikit
Progress to date/future areas of work	The first attempt to produce a National SoE for South Africa was made in 1992, when a report was submitted to the United Nations Environment Programme at UNCED in Rio de Janeiro, describing the South African environment and resource base (although South Africa could not participate fully in UNCED, but only had observer status). A prototype electronic NSoE report was then compiled by the Department of Environmental Affairs & Tourism (DEAT) in 1995, but was not published. This report is therefore the first National State of the Environment Report on the Internet for South Africa. The Internet was chosen as the preferred medium for this report (although an overview is also available in printed format), as it is widely and freely accessible to a broad spectrum of users, it can be easily updated, modified, and added to, and it gives greater flexibility in accessing the information. In this way, the report is useful to decision makers, environmental managers, and interest groups from different backgrounds, and for different purposes. In order to make this report useful to as wide an audience as possible, it is also available in Afrikaans, iXhosa, isiZulu, and Tswana. City-state of the environment reports are being developed in parallel with the national report for the Cape Metropolitan area, Durban, Johannesburg Metropolitan area and Pretoria Metropolitan area. These will provide information on local environmental issues specific to each city, and outline what can be done to enhance sustainable development and use of natural resources at a local level. As part of the State of Environment Reporting Programme initiated by the Department of Environmental Affairs & Tourism, four provinces, namely North West, Gauteng, Mpumalanga, and KwaZulu-Natal, have recently completed preliminary State of the Environment Reports. These may also be available on the Internet in the near future.
Timeframe	Although reporting on the state of the environment is not mandatory at this point in time, the department has decided to commission a comprehensive assessment of, and report on the state of the environment in South Africa. This will be the first comprehensive report since 1999. The main report, that will reflect on the state of the environment, human vulnerability to environmental change and the future state of our environment, will be known as the South African Environment Outlook 2005. The project started towards the end of September 2004, and a report was released in 2005.

Presentation of the information and indicators	The SoE Report on the Internet is constructed as follows: The first page is divided into three main sections. On the left are links to global and cities state of the environment reports. On the right are links to resources such as global indicators, maps and on line documentation. The centre part of the page contains links to the different sections of the national state of the environment report. The cooperating partners are shown as hyper links at the bottom of the page. Choosing a topic or issue (chapter) related to the national state of the environment report, links to a page giving a brief overview of the topic. Further links provide access to information on driving forces, pressures, state, impact, response, outcomes, linkages, data issues, and references used in compiling the contents of the chapter. Additional links are provided at the top of each page, and where appropriate, links to city-state of the environment reports are provided at the bottom of pages. Further links are provided in the text. The National State of the environment report uses several indicators that are presented as graphs or in some cases, in tabular or map format. The indicators are grouped according to main issues in: Climatic and Atmospheric change, Sustainability of Terrestrial Ecosystems, Sustainability of Water Resources, Sustainability of Coastal and Marine Systems, Social dimension, Economic dimension, and Political dimension.
Publications	National State of the Environment Report 1999 National State of the Environment Report 2005
Initiative Locations	Southern Africa
Contact Person	Dr Rudi Pretorius
Title	Director State of the Environment
Address	Department of Environmental Affairs and Tourism; Environmental Information and Reporting, Fedsure Forum Building, 315 Pretorius Street, Pretoria, 0002, South Africa
Fax Number	+27 012 320 5469
Telephone Number	+27 012 310 3713
Email	rpretorius@dent.gov.za
Website	http://www.ngo.grida.no/soesa/nsoer/index.htm http://www.ngo.grida.no/soesa/
Initiative Types	Sustainable Development Initiative, Methodology / Guideline, Local Agenda 21
Intended Use Of Initiative	Education / Awareness, Performance Measurement, Strategy Development
Geographic Units	Both
Framework	PSR-Pressure-state-response
Issue Areas	Agriculture, Atmosphere, Nature and Biodiversity, Climate Change, Economic Performance, Education, Employment, Energy, Freshwater, Governance, Human Health, Housing, Natural Resources, Oceans and Seas and Coasts, Population, Poverty, Public Safety, Social, Harmful Substances and Chemicals, Waste, Wetlands, Other, Marine, Antarctica and other external territories
Organization Types	national / federal
Mandate Requirement	Legislative
Steering Committee	http://www.ngo.grida.no/soesa/nsoer/general/whois2.htm
Public Involvement	consultation, public membership on committee
Funding Source	Norwegian Research and Development Agency (NORAD), and Department of Environmental Affairs and Tourism
Report Frequency	no fixed time
Public Access to Supporting Data	Yes

Example 3: Indicator System for Hungary's Lake Balaton Region

Indicators are typically developed with a focus on retrospective analysis of ecological and socio-economic trends and considered comprehensive from this point of view. However, comprehensiveness can also be thought of as a criterion whether indicators cover not only past but also expected future trends. This initiative is interesting not only because of its broad coverage of sustainability issues in a regional context, but because of the attempt to make use of some of the same indicators in both past and future assessment.

Another notable aspect is to establish a link between indicators across scale. Besides developing and analyzing indicators at the regional level, some of the applicable indicators are also developed with community scale data for some of the key towns in the Balaton region. Both regional and municipal scale data are to be presented through a single web portal that also integrates past and future trends and analyses.

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Initiative Title:	Integrated vulnerability assessment and adaptation strategies for Hungary's Lake Balaton region
Lead Organization:	Lake Balaton Development Coordination Agency (LBDCA)
Your organization:	IISD
Contact:	Gábor Molnár
Contact Organization:	LBDCA
Title:	Executive Director and Project Manager
Address:	8600 Siófok, Batthyányi u. 1., Hungary
Fax:	+36-84-317-002
Telephone:	+36-84-313-346
Email:	molnarg@balatonregion.hu, cynthia@balatonregion.hu, kktics@chello.hu
Web Site:	http://www.chrome.hu/bf/public/menu.php?m=177
Scope:	Sub-national
Goals of Initiative:	The overall purpose of the project is to contribute to a better understanding of the Lake Balaton ecological and socio-economic system's vulnerability and resilience arising from multiple forces of global and local change, including land use, demographic, economic and climate change and build capacity for more effective policy-making and adaptation measures in response. The project is complementing ongoing policy initiatives and scientific research, and has a clear niche by focusing on better understanding the vulnerability of the Lake and its watershed from an integrated perspective. Climate change is seen as one of the emerging important determinants of vulnerability, but its impacts are considered in the broader context of sustainable development. Through its training component the project will lead to measurable improvements in vulnerability assessment and adaptation capacity, and on-the-ground results will be achieved through initiatives financed by a small grants program using innovative financing mechanisms, such as public-private partnerships. Integrating criteria related to adaptation to global change into the regular grant-making activities of the Lake Balaton Development Council will ensure longer-term impact. Due to Lake Balaton's high profile and a focused engagement and influencing strategy, the project will significantly increase awareness of climate change impact, vulnerability and adaptation issues locally, nationally and internationally.
Framework:	The framework for indicators includes three categories: economic, ecological and social. The project also uses an analytic framework to study vulnerability based on internal and external pressures to the region, adaptation capacities and an enabling external policy environment.
Partnerships:	International Institute for Sustainable Development (IISD), UNEP / GRID-Geneva United Nations Development Programme (UNDP) Global Environment Facility (GEF) LEAD International
Progress:	The project uses indicators to provide a baseline analysis of vulnerability and to analyze future scenario trajectories. To date ca. 40 indicators have been developed, data collection and analysis is ongoing. Interaction among indicators is being analyzed using a cross-impact matrix as an interim methodological step before the construction of a meta-model.
Timeframe:	Project is due to end in December 2008. LBDCA is to take over maintenance of indicator system thereafter.
Presentation:	IISD as a project partner is developing a multifunctional and multi-scale tool called BalatonTrend that will integrate the web-based presentation of time series past trends and maps with the projection of future scenario and associated indicator trajectories. It will also provide access to raw indicator data and multimedia content related to selected trends.
Publications:	Project proposal, project brochure, indicator report being prepared.
Country or Continent or Worldwide:	Central and Eastern Europe
Date Established:	2006
Date of Last Report:	2007
Initiative Types:	Analytical Report, Indicators Initiatives, State of Environment Initiative, Sustainable Development Initiative, Other - describe
Other Initiative Type:	Integrated vulnerability and adaptation
Intended Use Of Initiative:	Adaptive Management, Education / Awareness, Indicator Development, Policy Development, Public Access to Information, Strategy Development
Geographic Units:	Both
Municipality:	Lake Balaton region
Province/State:	
Initiative Framework:	Capital based approach, Issue based
Issue Areas:	Agriculture, Air Quality, Atmosphere, Climate Change, Economic Performance, Education, Employment, Fisheries, Freshwater, Governance, Groundwater, Human Health, Land Use, Natural Resources, Nature and Biodiversity, Population, Poverty, Public Safety, Social, Transportation, Waste, Wastewater, Wetlands

Other Issue Area:	hydro geological conditions, condition of lake shoreline, environmental infrastructure, material consumption, economic diversity, tourism, real estate, awareness,
Type of Organization:	international government organization, international NGO, other - describe
Other Organization Type:	Regional development council
Mandate Requirement:	other – describe
Other Mandate Requirement:	Project is tied to mandate of LBDCA by the Government of Hungary to support sustainable development in the Lake Balaton region.
Steering Committee Present:	Project Management Board comprised of representatives of LBDCA, IISD and UNEP / GRID-Geneva,
Public Involvement:	consultation, other – describe
Other Public Involvement:	Multi-stage stakeholder involvement in indicator selection, scenario building and the identification and implementation of adaptation options.
Funding Source:	LBDCA, GEF, UNDP, UNEP, IISD
Report Frequency:	no fixed time
Public Access To Supporting Data:	Yes

Example 4: Katrina Index

In contrast with the Lake Balaton initiative, where emphasis is on early warning and emerging vulnerability, the Katrina Index is focused on issues that arise in the context of post-disaster reconstruction. The Index, which is actually a collection of *non-aggregated* indicators basically monitors the state of New Orleans’ rebound to its pre-Katrina condition, which it uses as a benchmark. Hurricane Katrina’s effects were felt across the entire spectrum of sustainability issues in New Orleans and reconstruction has to be equally broadly focused. Therefore, indicators are focused on those priorities where rebuilding is most intensively focused. One could further extend these measures to also capture changes in some of those conditions, particularly in the environmental infrastructure domain that contributed to the disaster. Emphasis on immediate priorities that often emerge in the aftermath of major crises such as Katrina can be balanced with perspectives on root causes, as another criterion for comprehensiveness.

Title of Initiative	The Katrina Index
Lead Organization(s)	Brookings Institution Metropolitan Policy Program, Greater New Orleans Community Data Center
Description of Goal	Beginning in December 2005, the Katrina Index began monitoring the social and economic recovery of the Gulf Coast region, especially the New Orleans area, from the storm’s impact in August 2005. Relying on nearly 40 indicators, the Index has aimed to provide members of the media, key decision makers, nonprofit and private sector groups, and researchers with an independent, fact-based, one-stop resource to monitor and evaluate the progress of on-the-ground recovery. Starting in 2007, The Katrina Index is being released as a joint collaboration between the Greater New Orleans Community Data Center and the Brookings Institution Metropolitan Policy Program. The goal of this collaboration is to bring an even better, more tailored assessment of recovery to this Index’s many users.
Geographic Scope	Metropolitan Region
Municipality, Province/State	New Orleans, Louisiana
Partners	Blue Moon Fund, Living Cities, Inc.
Progress to date/future areas of work	The Brookings Institution and the New Orleans Data Center will continue to release and update the Katrina Index on a monthly basis, likely on the second Wednesday of every month.
Initiative Locations	North America, UNITED STATES
Contact Person	Allison Plyer
Email	info@gnocdc.org
Website	http://www.gnocdc.org/KI/KatrinaIndex.pdf
Initiative Types	Quality of Life
Intended Use Of Initiative	Education / Awareness, Performance Measurement, Public Access to Information

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Geographic Units	Political / Administrative
Framework	Issue based
Issue Areas	Economic Performance, Education, Employment, Human Health, Housing, Population, Poverty, Social, Transportation, Other, Infrastructure, Emergency Response
Organization Types	NGO
Report Frequency	Periodic
Public Access to Supporting Data	Yes
Notes/Comments	To contact the Katrina Index, please leave comments or questions through the "Ask Allison" link at www.gnocdc.org .

Example 5: ILAC

This initiative is notable not only for the comprehensiveness of the indicator approach promoted, but for the broad political consensus that such an approach is required in order to better understand and tackle environmental problems in the Latin American and Caribbean region.

Title of Initiative	Iniciativa Latinoamericana y Caribeña para el Desarrollo Sostenible (ILAC)
Lead Organization(s)	Ministerio del Ambiente y Energía (MINAE) / Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) / Observatorio del Desarrollo - Universidad de Costa Rica
Description of Goal	The following are the key goals of this initiative: a) Consolidate and continue existing efforts in LAC in order to implement programs and projects of interest for the region so that the recommendations in Program 21 will develop with an emphasis on participatory mechanisms. b) Develop actions to encourage the participation of civil society and the private sector in order to promote sustainable productive activities and stimulate sustainable lifestyles. At the same time, allow for conservation and the sustainable use of environmental goods and services that are essential for life. c) Promote the instrumentation of sustainable development models d) Contribute, as a political framework, in the identification and prioritization of financial, institutional and technical mechanisms for an effective implementation of Programme 21, the Barbados Action Plan, and the results of the 22nd Special Session of the UN General Assembly.
Geographic Scope	National, Multinational, International
Publications	Document with goals and mandate for initiative: www.eclac.cl/dmaah/noticias/discursos/9/11769/ILAC%20ESPANOL.pdf Iniciativa Latinoamericana y Caribeña para el Desarrollo Sostenible (ILAC): Indicadores de Seguimiento http://www.odd.ucr.ac.cr/documentos/espanol/ILAC_2004_FINAL_ESN.PDF Iniciativa Latinoamericana y Caribeña para el Desarrollo Sostenible (ILAC). Costa Rica 2005 http://www.odd.ucr.ac.cr/ilac/
Initiative Locations	South America, Central America, Caribbean
Website	http://www.odd.ucr.ac.cr/ilac/
Initiative Types	Indicators Initiatives, Sustainable Development Initiative, Inventory
Intended Use Of Initiative	Policy Development, Performance Measurement, Strategy Development
Geographic Units	Both
Framework	Environmental media, Issue based
Issue Areas	Nature and Biodiversity, Education, Employment, Energy, Forestry, Governance, Human Health, Land Use, Oceans and Seas and Coasts, Poverty, Social, Waste, Other, vulnerability
Organization Types	national / federal, academic / research, international government organization
Mandate Requirement	other, LAC Ministries of the Environment Forum
Public Involvement	Unknown
Report Frequency	no fixed time
Public Access to Supporting Data	Yes

Example 6: Environmental indicators for Metropolitan Melbourne

The use of indicators at the local level is vital for the involvement of citizens and for local governments to address the most important threats on a local, but also at the global scale. This initiative is an outstanding example on how this can be done.

It is outstanding in the sense of how to make complex information on the environment and health available to a broader audience. Also, the Melbourne initiative is outstanding in the sense that the information is understandable by non-specialists, while experts can dig deeper and easily access more specific details. And

finally it is also outstanding in the sense that it creates opportunities for citizens and stakeholders to take part in envisioning and taking action in the interest of sustainable development.

The Melbourne initiative is based upon PCR (Pressure – Condition – Response) framework which is similar to the PSR framework (Pressure – State – Response), and its indicators are presented in 11 categories applicable to Melbourne. While these headline items have been found relevant for the Metropolitan Melbourne and not all items are necessarily relevant for other cities around the Globe, the way the information is structured has broader relevance.

Title of Initiative	Environmental Indicators for Metropolitan Melbourne
Lead Organization(s)	Melbourne City Council/Australian Institute of Urban Studies
Description of Goal	To identify, collect and analyse data concerning Metropolitan Melbourne's environmental state and compile in a central document which can be used by Local Government officers to compare and analyse their own environmental impacts and initiatives.
Geographic Scope	Metropolitan Region, Local/Community
Municipality, Province/State	Metropolitan Melbourne
Framework for Indicator Set	Data is collated from various government, regulatory agencies and other sources and compiled into one document and reported on at a local government municipal level to try to assist local councils assess, analyse & compare their own environmental initiatives and the impacts of them. Indicators are reported via the pressure - state - response model.
Partners	The Steering Committee for the project is chaired by the Australian Institute of Urban Studies (Victorian Division) and coordinated by Melbourne City Council. Membership comprises 13 local councils from metro Melbourne (the number is increasing), the Municipal Association of Victoria (local government peak body) and several State Government agencies including the Environmental Protection Authority, Department of Sustainability & Environment, Sustainability Victoria and Parks Victoria
Progress to date/future areas of work	Annual Bulletins #1 to 8 have been published with indicators on: waste (litter), water (waterways & beaches), air & greenhouse gas emissions, open space, transport, biodiversity, built environment. The reports are presented in a pressure - condition - response format. There is a summary of each group indicators assessing the Metropolitan Melbourne's progress on each indicator.
Timeframe	Annually published bulletin. Alternate indicators are reported on every two years.
Presentation of the information and indicators	Published as a paper document and on the internet via: City of Melbourne website: http://www.melbourne.vic.gov.au/research AIUS website: http://www.aius.org.au/indicators/ Consists of tables, charts and text. All source data is referenced.
Publications	Environmental Indicators for Metropolitan Melbourne Bulletins #1, August 1998, Bulletin #8, October 2005 Downloadable (PDF) from City of Melbourne web site as well as: www.aius.org.au/indicators/ www.melbourne.vic.gov.au/research
Initiative Locations	Australia, New Zealand and Pacific Islands
Contact Person	Karina Bader
Title	Senior Research Analyst
Address	City of Melbourne GPO Box 1603M Melbourne Victoria Australia 3001
Fax Number	+61 3 9650 3572
Telephone Number	+61 3 9658 9963
Email	Karina.Bader@melbourne.vic.gov.au
Website	http://www.aius.org.au/indicators/
Initiative Types	Indicators Initiatives, State of Environment Initiative, Performance Report, Analytical Report
Intended Use Of Initiative	Education / Awareness, Policy Development, Performance Measurement, Indicator Development, Strategy Development
Geographic Units	Political / Administrative
Framework	PSR-Pressure-state-response, Capital based approach
Issue Areas	Air Quality, Atmosphere, Nature and Biodiversity, Climate Change, Energy, Freshwater, Governance, Land Use, Oceans and Seas and Coasts, Recreation, Harmful Substances and Chemicals, Transportation, Waste, Wetlands
Organization Types	municipal, academic / research
Mandate Requirement	not mandated
Public Involvement	public membership on committee
Funding Source	Contributions from Local councils and AIUS, as well as occasional sponsorship from state government agencies
Report Frequency	1 year
Public Access to Supporting Data	Yes
Notes/Comments	a summary of the report is also listed on the City of Melbourne Research website: www.melbourne.vic.gov.au/research

Conclusions

As the brief sampling of selected initiatives from the Compendium illustrate, efforts to strengthen the evidence base of planning, policy implementation and evaluation can and do yield rather different answers depending on who is asking the question, where, how and when. The indicators that citizens of New Orleans would have selected before Hurricane Katrina would have been rather different than those on the indicator list in the Katrina Index. Indicators proposed by ILAC would be applied differently in Costa Rica than in Argentina. And measures that talk about watershed processes for the Lake Balaton region in Hungary would need to be adjusted for applicability to Lake Chad or Lake Winnipeg.

Ideally, local indicator systems could be smoothly nested under regional or national sets, and national sets could be derived from or be closely linked with globally agreed measures. As these and other entries in the Compendium illustrate, however, there are many ways to be comprehensive when it comes to developing indicator systems. Despite many efforts to develop common indicator sets whether for countries (e.g., by ILAC, the UN Commission for Sustainable Development and others), for a sector (e.g., by the OECD for the environmental aspects of agriculture, by signatories of the Montreal Process), or for a particular scale (e.g., by ICLEI for cities), experience to date tells us that common sets have no universal applicability. Whether there is explicit awareness of it or not, 'comprehensiveness' is typically rooted in a particular worldview or rationality, which is not necessarily shared. For instance, comprehensive indicator systems developed under the Montreal Process may not be automatically adopted by aboriginal forestry associations that rely on traditional knowledge in their forest management practices. In the interest of making indicator sets relevant and in order to build ownership, there is a need for a technical / political / scientific process to determine what measures work best for a particular context.

While it would probably be unrealistic to expect universal cross-scale, harmonization related to issues that cut across scales and the interests of a wide range of political actors and stakeholders is essential. As the example of the indicators related to the Millennium Development Goals (MDGs) illustrate, if there is sufficient consensus on certain global issues, it is possible to come up with core indicators.

We offer the following conclusions arising partly from our work on the Compendium but also from over a decade long practical experience working on indicator systems in various contexts.

1. In the interest of further harmonization evolving, it is necessary to keep track of and periodically summarize the experience with sustainable development indicators. This has been done by organizations such as the UN-CSD, OECD, SCOPE and others, and in a small way also complemented by the Compendium. We invite national, regional and local authorities, the private sector, the academic community, civil society, aboriginal groups and others to share their indicator experience through the Compendium, as a simple and cost effective way of making connections between ongoing indicator efforts.

2. We see the continuing need for international efforts to harmonize indicator systems similar to those lead by the UN-CSD. Emphasis on selected headline indicators related to common policy issues rather than or besides comprehensive sets should be considered.

3. We see particular need to both strengthen and learn from comprehensive indicator efforts at the local level. There is a multitude of ongoing efforts around the world and we also need to see through the few specific local initiatives that our organizations are leading or involved in. Perhaps because of the closer proximity of local government to stakeholders and sustainability issues on the ground there is clearer understanding of the need for and uses of indicators in planning, decision-making and evaluation. We believe the energy and creativity generated through local initiatives could, when added together, catalyze higher-level policy change and offer useful lessons for sustainable development governance.

4. We see the need for elaborating guidelines to be used by local/regional authorities in order to build up local reporting systems in order to monitor the performance of the community - in order to communicate this information to the community / public - in order to involve the public - and finally with the backup of the public to adopt the most adequate local policies.

5. The work on indicators and indicator systems should be coordinated with efforts to improve the system of national accounts particularly its environmental satellite accounts, using as possible a capital based framework.

6. In order to facilitate harmonization among indicator systems, further efforts could be made to harmonize indicator frameworks and the methodologies of developing indicator sets and generating the underlying raw data. Efforts such as the Bellagio Principles developed over a decade ago

by a group of prominent international experts can provide a starting point for creating a set of principles that take the experience gained in indicator development into account.

7. Although it's not formalized around a central institution and policy process, there is in fact a global policy agenda emerging around the development of alternative ways of measuring progress. In order to make sufficient progress, the discourse on indicators must have strong technical foundations, but it also must have a much stronger foundation in policy. We see a need both for a high level policy dialogue on the institutional dimensions of this issue, including the role of existing organizations and the question of capacity and resources required to arrive at a robust new measurement system that takes sustainable development priorities into account.

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**Annex 1.
Information base format**

The Compendium is designed to facilitate remote data insertion and extraction, and to allow for the search and retrieval of entries through eight search tool fields. Each initiative has a unique entry in the Compendium and includes information as shown in Table 1 (below).

Table 1: Compendium Form - Search the Compendium

Title of initiative	The full title of the initiative.
Lead organization(s) for this initiative	Include the full organization name(s) before any acronyms.
Your name	The name of the person entering the information.
Your e-mail	The e-mail of the person entering the information. This e-mail will enable access to the initiative at a later date for editing.
Your organization	The name of the organizations with which the person entering the information is affiliated.
Date initiative established	Select a year between 1960 and 2020.
Date of latest report or proposed release	Select a year between 1960 and 2020.

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Type of initiative	<p>A program, project or report using social, environmental and economical indicators, including those that measure the progress towards a common vision or goal.</p> <p>Includes:</p> <ul style="list-style-type: none"> • Analytical Report: A technical or scientific document that examines an issue through the use of concrete data and/or professional methodology and then recommends an action. • Certification Program: Indicators developed in order to meet standards of a certification program, often in the natural resources sector (i.e., forestry). • Indicator Initiatives: A written record of the current state and use of the indicators that a specific initiative is using. Includes graphic and/or tabular displays of the indicators. • Inventory: An itemized list of indicator initiatives with traits, indicators and categories specific to those initiatives. • Local Agenda 21: An initiative that is focused on the long-term strategic action for sustainability in municipal administration, reflective of the Local Agenda 21 Program. • Methodology/Guideline: A report, statement or booklet that describes a methodology for developing specific indicators or procedure for an indicator initiative. • Performance Report: A written record or project portraying the progress toward an initiatives goals or initial statement of intent(s). It provides an account of the work that has been done, the circumstances under which the initiative was performed and the extent to which the work done achieved the desired goals. • Quality of Life: An initiative that is focused on a set of issues responsible for determining quality of life for people. • State of Environment Initiative: Generally describes the current condition of the environmental issues of concern and may specify areas requiring further work or research and how these will be addressed. • Sustainable Development Initiative: An indicator report that focuses on economic, social and environmental issues for a particular geographic area and addresses or attempts to address the interconnections of the issues. • Other: Describe.
Intended use of initiative	<p>The primary purpose(s) towards which the initiative is directed and that one intends to follow.</p> <p>Includes: Adaptive Management, Advocacy, Education/Awareness, Indicator Development, Performance Measurement, and Policy Development, Access to Information, Research and Strategy Development.</p>
Description of intended use	Brief description of the intended use of the indicator initiative. Refers to the goal of the initiative itself, rather than broader societal intended outcomes.
Geographic scope of initiative	<p>Geographic area covered by the report.</p> <p>Includes: Global, International, Local/Community, Metropolitan Region, Multinational, National, Other, State/Provincial, Sub-national</p>
Geographic units used	<p>Geographic units used in the report.</p> <p>Includes: Political/Administrative, Natural Areas or Both</p>
Country or continent or international	The geographic location (national and above), in which the initiative and its indicators are intended to perform. If the indicators are intended for a sub-national location, choose the country in the field. Choose most relevant one.
Municipality, Province/State	Name of municipality or state in which initiative applies, if applicable
Framework for initiative	<p>A structure for organizing, grouping or classifying the indicators used by an initiative or the overarching worldview on which the initiative is based. Clarification of which conceptual model or framework is used in the identification and organization of indicators.</p> <p>Includes: Capital-based Approach (natural, social, economic, cultural), DPSIR-Driver-Pressure-State-Impact-Response, Environmental Media (air, freshwater, marine, wildlife, ecosystem, etc.), Issue-based (climate change, acid rain, air quality, etc.), PSR-Pressure-state-response, and Resource Sectors (agriculture, forestry, mining, etc.).</p>

Issue areas	<p>The particular areas or issues that the initiative is addressing and will attempt to perform upon.</p> <p>Includes: Acid Rain, Agriculture, Air Quality, Arts and Culture, Atmosphere, Climate Change, Drinking Water, Economic Performance, Education, Employment, Energy, Fisheries, Forestry, Food Safety, Freshwater, Governance, Groundwater, Harmful Substances and Chemicals, Housing, Human Health, Land Use, Manufacturing, Mining, Natural Resources, Nature and Biodiversity, Noise, Oceans, Seas and Coasts, Population, Poverty, Public Safety, Recreation, Social, Stratospheric Ozone Depletion, Transportation, Waste, Wetlands, Other.</p> <p>This list may be expanded.</p>
Lead organization(s)	Name(s) of organization(s) leading the initiative or producing the report
Type of organization(s)	Select the category that best describes the lead agency
Partners	Group or organizations notably involved in the initiative. List the complete names of all major partners.
Mandate requirement	An official or authoritative goal or requirement that is responsible for the onset of the initiative.
Steering committee present	Describe structure of steering committee, if present. This field attempts to assess how indicator initiatives and SOE reports are governed.
Public involvement	<p>The manner in which the public is involved in the initiative process or in evaluation of the initiative.</p> <p>Includes: Consultation, Evaluation Process, and Public Membership on Committee, Unknown and Other.</p>
Funding source	The organization or sponsor responsible for complete or partial assistance in the initiative program. Name of funding organization(s) or sponsor(s).
Frequency of reports	The time period and the rate at which the reports are created and/or released. Select the category that best describes the report frequency or reporting plans for the initiative.
Public access to supporting data	Are the data for this initiative available for viewing and/or downloading by Compendium users? Will users be able to look at and/or download data that are used in initiative or report?
Web site address for initiative or report	Web address specific to initiative or report.
Notes/comments	Any additional information, unique features.
Contact person	Name of person most closely associated with initiative or report.
Title	Contact person's title or position.
Organization	Organization with which that contacts person is affiliated.
Telephone	Telephone number of contact person.
Mailing address	Enter complete mailing address.
E-mail address	E-mail address for contact person.
Progress to date/future areas of work	The status of the indicator initiative, including whether the project is in early, mature and completion stages.
Presentation of the information and indicators	Type of presentation including databases, graphics, models and other visualization tools.
Publications	Publications related to the indicator initiative, including year of publication, format (online, hard copy) and publisher.

Annex 2

About the International Institute of Sustainable Development

The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and assessment, and sustainable natural resources management. Through the Internet, we report on international negotiations and share knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

IISD's vision is better living for all — sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core-operating support from the Government of Canada, provided through the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC) and Environment Canada; and from the Province of Manitoba. The institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.

IISD's Measurement and Assessment (former Measurement and Indicators) Program was established in 1994. Our work is focused on improving decision-making through the development and use of information tools and processes compatible with sustainability requirements. We play a key role in integrated, forward looking environmental assessment and reporting processes from the local to the global level, including the design and delivery of training and capacity building programs for clients in the public sector. Our team brings a solid understanding of conceptual issues, scientific perspectives and thorough consideration of the policy process to bear on the analysis of complex sustainability issues and produces information that is understandable for decision-makers and the non-expert public.

Annex 3

About The International Federation of Environmental Health

The International Federation of Environmental Health is a non-governmental organisation of national organisations representing some 60,000 environmental health professionals in 37-member countries worldwide. Since its incorporation in 1986 it has actively promoted care for the environment in

the interest of human health through a variety of means, including, among other things, the holding of nine world congresses and publication of the proceedings; the adoption, publication and dissemination of global position papers (see <http://www.ifeh.org/about.policies.html>), the establishment of a comprehensive webpage - www.ifeh.org, and the wide circulation of its publication *Environment and Health International*

The Federation, in addition, is active in the field through its members, and benefits from the accumulated knowledge, experience and expertise of Environmental Health Professionals working around the world. The Federation promotes a holistic approach to environmental sustainability and encourages inter-sectoral collaboration, multidisciplinary and community-participative activities, and the utilization of meaningful sustainability indicators to inform good EH management practices at local, regional and international levels.

As a result of the collaborating agreement with the IISD the IFEH has formed a working group to disseminate information and to encourage all IFEH member organisations to participate in the collection of examples on sustainability indicator initiatives to the Compendium. Inside the IFEH this initiative has been named: The IFEH Sustainability Initiative (IFEH SII)

The IFEH SII Working group comprises:

- Henning Hansen, Coordinator of the initiative, ENVINA Denmark
- Fred O' Brien, Honorary Vice President IFEH, CIPHI Canada
- Steen Fogde, ENVINA Denmark
- Domenic Losito, CIPHI, Canada
- Raymond Ellard, Honorary Secretary IFEH, EHOA Ireland

IFEH is still expanding and its current member organizations are divided into 5 regional groups:

- **Africa regional IFEH group:** Botswana, Kenya, Liberia, Malawi, Mauritius, Nigeria, Rwandese Republic, South Africa, Tanzania, Uganda, Zambia, Zimbabwe
- **Americas regional IFEH group:** USA, Canada and Jamaica
- **Asia & Pacific Regional IFEH Group:** Australia, Hong Kong, Malaysia, New Zealand, Singapore, Sri Lanka
- **European Regional IFEH group (EFEH):** Austria, Cyprus, Denmark, England, Wales and Northern Ireland, Finland, France, Germany, Ireland, Latvia, Lithuania, Malta, Netherlands, Norway, Scotland, Sweden

- **Middle East IFEH Regional Group:** Saudi Arabia

Besides its full organizational members, IFEH also houses associate member organizations and many university faculties as academic associate members. Altogether, through IFEH's global network there is access to an estimated 60.000+ professionals in the area of environmental health as well as environmental protection.

Annex 4

List and focal area of work of researchers involved in the current Compendium update:

- Diego Martino, CLAES (Centro Latino Americano de Ecología Social), Argentina Focus area: Latin America and the Caribbean – Spanish
- Angeline Gough, IISD Intern, Lake Balaton Development Coordination Agency, Hungary Focus area: Forestry
- Amy Miller, Rutgers University, New Jersey, United States Focus area: USA
- Shilpa Nischal, TERI, New Delhi, India Focus area: Asia
- Sulema Pioli, University of Sao Paulo, Brazil Focus area: Latin America and the Caribbean – Portuguese
- David Wamukuru, Egerton University, Kenya Focus area: Africa

Deadline for submission of articles for the next issue is 1st May 2008

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COMPUTERS AT WORK AND AT HOME: INFLUENCE ON HEALTH AND PREVENTION OF HEALTH PROBLEMS

by D. Gorobeciené, A. Kirpičiovas, State environment health centre, JSC “COWI Baltic” (Lithuanian Union of Hygienists and Epidemiologists)

Keywords: computer, vision, health effects, workplace, and safety.

Preface. It is difficult for us to imagine today's modern life without the computer: being one of the most popular working, educational and leisure (especially for youngsters) implements. A decade ago it changed our lives significantly in regard to the receipt and distribution of information; it also gave access to a vastly expanded source of information and, in addition, access to that information was speeded up. Because of the continued expansion in the number of computer users it appears as if this process will continue to happen.

However, the process of computerization has not been without an increase in the negative effects on human health. Of course, computers on their own are not harmful but working with them can damage health in certain ways. Thus, in spite of economic benefits that arise from computerization, it is extremely important to attempt to ensure that the detrimental health effects are kept to a minimum.

Increased interest in the adverse health effects on people working with computers was evident in the scientific community as far back as 1986 at an international conference in Sweden entitled: “Working with video displays”.

In Germany it is recognised that persons working with video displays are amongst some of the most at-risk workers. The first scientific presentations about the influence of computers on human health related to the visual disorders. Later it was suggested that there were problems with the muscular system, mental problems, stress and monotony. Furthermore research had started on the harmful effects of electro-magnetic radiation of short wave sound on human health.

Indeed in the evaluation of a working environment it is necessary to link the computer's technical parameters to the comfort of the user. This is a complex relationship bearing in mind that a computer is a multiplex intellectual system and, as such, its control is much more complicated than other working devices.

In Lithuania it is estimated that there are approximately half a million workers who do not have regard to the necessity to build in periods of rest and who tend to spend too much time in front of the computer. Computer-related health problems are also seen in children who spend significant periods of their leisure time on computers; some of the symptoms being dependence-related, while others show evidence of psychosocial problems.

Many authors emphasize that inappropriate computer use may lead to depression and a decrease in working efficiency, as well as being harmful on physical health. Fortunately, those factors can be ameliorated.

This article will summarize some of the scientific research being undertaken in Lithuania on the harmful effects on the human health of computers in the work place. Although there is a shortage of such research the paper will also discuss some of preventive measures adopted to maintain the health and safety of computer users in Lithuania.

Research methods. Computerized working places were examined using random screening in 52 companies in Vilnius (using questionnaires). Investigations and ergonomic evaluations were carried out on 183 computerized working places used by 134 women and 49 men between the ages of 20 & 58 years of age and who had been employed for not less than 1 year. Questionnaires were based on that published in the electronic publication "Computer and Health", complementing them with questions taken from the State Labour Inspectorate document "Safety and health implementing inspection module" [44].

Results and their consideration. Below are the main health problems that may occur when working with a computer:

1. Disorders that derive from eye strain (eye infections, xerosis (dry eyes), streaming eyes, pain, sight deterioration, the flickering of letters and lines);
2. Discomfort in the bones and muscles (pain in the shoulder, the neck, the backbone especially the lumbar part, the carpus) as well as poor mobility, muscle spasms, tremors, tingling sensations and carpal tunnel syndrome);
3. Face & neck skin lesions;
4. Harmful effects on fertility and on the unborn foetus.

Ophthalmic symptoms are common and in our study 40-85% of workers complained of eye fatigue derived from looking at small objects. The main symptoms identified were: frequent headache, eye

strain, stress, sweats, forehead and temple pain, diplopia (double-vision causing blurring of letters and lines), streaming eyes & giddiness, as well as twitching of the eyelids and facial muscles, and sometimes migraine may also occur [3, 8, 38].

The symptoms of eye strain (astenopy) may be divided into two groups: symptoms affecting the eye (eye ache, infections, dry eyes and streaming) and symptoms affecting vision (poor eyesight, flickering, double vision (diplopia) and spots before the eyes). The latter symptoms are more common and may vanish within an hour after finishing working, but for some the symptoms may remain until the next day [3]. In evaluating workers' vision fatigue, it is important to remember that this can also be caused by TV watching (7-14%) or reading (6 - 8%) for a long time (T. Laubi, USA facts). The astenopy symptoms are more common in women than in men and they are not related to age. The most harmful form of astenopy is a threat to those who work on texts (writing, editing). A correlation has also been found between sustained working with computer and astenopy. In addition working with computers may result in "dry eye" syndrome which occurs because of the screen "winking" [3]: where the number of "winkings" is less than 10 per minute, dryness affects the cornea causing irritation which is not relieved by the eye's natural watering [40, 41]. Prolonged working with computers can exacerbate the ophthalmic symptoms (see table). Our research revealed the following: the spread of vision disorders depends on the display screen and whether or not it has protection against reflection from the light sources, glass walls, or light painted walls. All the problems relating to vision are most common in workers whose computer display screens are not covered with anti-reflective coverings and those whose working places were inadequately illuminated.

In recent times disorders of the skeletal and muscle systems have been the most significant medical problem [8]: with restricted mobility, monotony, static strains, and frequent stress situations reported. It is now accepted that prolonged sitting damages bones and muscles.

Working with computers leads to static muscle strain because of the head being in a fixed position (and the distance from the eyes to the computer screen is also fixed); this restricts hand- and whole-body movements. During computer working muscles are in a medium state – between contraction (systole) and relaxation. This leads to the static muscle strain, decreased blood circulation and metabolic problems. [9, 10]. It was found that the most common neck and

shoulders damage occurs in those who enter data into the computer, while working in dialog regime causes problems with joints in the hand and wrist, also damage to the bones in the lumbar region [11, 12, 13, 14, 15]. Carpal tunnel syndrome comes from monotonous wrist movements (*Sindromum canalis carpalis*), i.e., damage to the middle nerve. Torpor or restricted movement of the metacarpus, thumb and index finger and reduction of muscle energy indicates this syndrome [8]. Often one of the first symptoms is searing ache in the night and in later stages atrophy and paralysis of the thumb muscle may occur [16].

In addition itching of the skin of the face and neck is one of problems that result from work with computers. These symptoms vanish after finishing work, on the weekends and during holidays [3]. There is a relationship between the intensity of a rash and working duration [20, 21]. These symptoms occur most often if the humidity of working place is less than 40% and the electrostatic load is high [3].

Stress in the working place may exacerbate all of those symptoms [3]. In the EU stress is the most common health problem after backaches [33, 34]. Stress may arise from psychosocial factors (strict demands, intimidation and violence). It is experienced when working tasks exceed a worker's ability to face them [34]. The main stressors are identified as having the responsibility for safety, working in isolation, permanent repetitive work, being forced to work at a high speed, the need for precision, undue haste and being faced with complex tasks. [37]. According to the findings of USA Work Defence and Profession Illness National Institute, those who work with computers experience more stress than those who do not [3]. Professional stress is one of the causes of the development of neurosis. Lithuanian researches also confirm that 70% of persons working with computers suffer from stress [3]. It is obvious that nobody is going to refuse to be issued with a computer; however, it is particularly important to know the ways to avoid the negative effects on one's health. Our research revealed that about 11% persons employed in using computers had no information on the health and safety implications of such use. Also it was found that not all employers insisted on eye tests before employing workers who would use computers in their work. Whereas, in Lithuania, an advanced health test once every two years is obligatory (LR Health safety minister the 31st of May, 2000 injunction No. 301 "Concerning preventive inspection in health care institutions", ĩn. 2000, Nr. 47-1365).

Conclusions.

1. Working with computers for 10 or more years may cause such troubles as "dry-eye" effect (2.5 times more likely) (it may arise when person is working more than 4 hours per day), flickering of words or lines (4,6) and worsening eyesight (1,8). All the aforementioned symptoms are related to the duration of working with computers. Furthermore, it was found that LCDs have less effect on visual disorders than kinescope displays.
2. According to the research, the following disorders of skeletal and muscle systems have been detected: the lumbar region (30.1% of workers), shoulder (25.7%), neck (23.5%), wrist (13.7%). Indeed, pain in the lumbar region occurs 2.1 times more in those who work with computer more than 4 hours per day.
3. It was found that there occurred fewer disorders in working places that adopted good practice. Therefore, it is essential that working places should be ergonomically designed with comfortable furniture, proper lighting, appropriate heating, easily controlled monitors and sufficient working space. For new working place settings LCDs are recommended.
4. It is essential to plan work according to the right working-resting time regime for both employee and employer. Specialists recommend regularly exercising the eyes and also the whole body. Those who follow these recommendations, suffer fewer problems with vision, and with discomfort in the bones and muscles.
5. Employers should take into account that relaxed employees work more efficiently and that investment into ergonomic working places pays dividends economically.
6. In order to prevent health problems affecting computer professionals, it is essential to detect disorders at an early stage and also to apply appropriate corrective action. Such action will prolong efficiency and will give economical advantages, with savings in resources in respect of existing and of new workers.

SUMMARY

The aim of this research was (i) to ascertain the ergonomic situation in computerized workplaces, (ii) to estimate the prevalence of health problems affecting employees working with computers, (iii) to examine the environment of computerized workplaces and (iv) to evaluate its influence on the health of people working with computers. The study covered a wide cross section of workplaces. The ergonomic situation in computerized workplaces was assessed in 52 enterprises in Vilnius, using an anonymous questionnaire. 183 employees (134 women and 49 men) were involved in the research.

The statistical data manipulation was performed using EpiInfo 2000 computer program. The occurrence of health problems (like disorder of vision, bones and muscle systems, stresses, and headaches) was determined. The occurrence of skin problems of the neck and face is not very widespread, compared with other health problems affecting people working with computers. 9.3% of people complained of suffusion of skin; itching of the skin affecting 7.1%, and skin rashes – 2.2%. Also 74.8% of the research group mentioned that they suffered from stressful situations several times a month, 19.6% suffer stress several times a week, and even 5.5% of the research group has stressful situation at work every day.

Conclusion: the prevalence of visual disorders among people working with computers depends on working period, also on the time spent working with the computer. It is also influenced by the distance from the eyes to the monitor, on the monitor's type, on various ergonomic parameters related to the display screen and also on reflections, which form on the surface of the screen. Problems related to the skeletal and muscular systems depend on the time spent working with computers, on variety of movements in the work environment, on the ease with which the workers' position can be changed during the work and also on ergonomic parameters including the construction of the furniture. Problems affecting the skin of the face and neck depend on monitor's type and on the humidity of the working environment.

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1 table. Vision disorders according to seniority.

Vision disorders	Seniority						Total (n=183)		
	Less than 10 year (n=160)			10 year and more (n=23)			Abs. nr.	%	95% PI
	Abs. nr.	%	95% PI	Abs. nr.	%	95% PI			
„Dry-eye“ effect	25	15,6*	10,4-22,2	9	39,1*	19,7-61,5	34	18,6	13,2-25,0
Flickering of letters and lines	9	5,6*	2,6-10,4	6	26,1*	10,2-48,4	15	8,2	4,7-13,2
Diplopia	10	6,3	3,0-11,2	2	8,7	1,1-28,0	12	6,6	3,4-11,2
Eye streaming	24	15,0	9,9-21,5	1	4,3	0,1-21,9	25	13,7	9,0-19,5
Suffusion	29	18,1	12,5-25,0	6	26,1	10,2-48,4	35	19,1	13,7-25,6
Aches	23	14,4	9,3-20,8	7	30,4	13,2-52,9	30	16,4	11,3-22,6
Clear sight decline	41	25,6*	19,1-33,1	11	47,8*	26,8-69,4	52	28,4	22,0-35,5
Frequent winking	21	13,1	8,3-19,4	5	21,7	7,5-43,7	26	14,2	9,5-20,1

* When seniority is less than 10 years and when it is more than 10 years the difference is statistically dependable ($p < 0,05$)

HUDDLES OF PUBLIC PARTICIPATION IN ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN SWAZILAND

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ABSTRACT

The EIA process in Swaziland is lacking in public involvement. A study was carried out in 2006 to establish the obstacles hindering public involvement in EIA in the country. It targeted all stakeholders in the Hhohho, Lubombo, Manzini, and Shiselweni administrative regions of the country. Three major development projects were purposively sampled per region and a sample population of 293 interviewees was conveniently selected. The study adopted a quantitative approach and used interview schedules and observations during scoping meetings. Secondary data were obtained from EIA reports at the Swaziland Environment Authority (SEA), and a diary to record anecdotes was also used. The data was analyzed using Microsoft Excel. The study revealed the obstacles that hinder public involvement in the EIA process in Swaziland. It recommended that, the SEA should conduct capacity building campaigns in order to sensitize the Swazi Nation on the importance of EIA and the crucial role people play in shaping up development projects. In addition, SEA should require proponents with their consultants to empower the affected parties with information about the upcoming development projects so that they can participate objectively.

Keywords: Impact assessment, public participation, involvement, environment, development, proponent.

INTRODUCTION

Increasing interest in environmental issues and in sustainable development has grown over the past three decades and has focused on better management of human activity in harmony with the environment. Since its establishment in the USA in 1969, EIA has spread worldwide in various forms and has become an approach in good currency (Glasson *et al.*, 1994). Whereas Wood (1995) defined EIA as the evaluation of the effects likely to arise from a major project or other actions significantly affecting the natural and man-made environment, Fuggle and Rabie (2000)

defined it as an activity designed to identify and predict the impact on mankind's health and well-being of legislative proposals, programmes, projects and operational procedures, and to interpret and communicate information about the impacts.

Process and Objectives of EIA

According to Glasson *et al.* (2001), one of the objectives of the EIA process is to provide information about the likely environmental impacts of a proposal to the developer, public and decision makers in order to make a better decision. Thus, as pointed out by Fuggle and Rabie (2000), EIA should be understood as the administrative or regulatory process by which the environmental impact of a project is determined.

In Swaziland, EIA entails the process of predicting and evaluating the likely environmental impacts of a proposed project where the scale, extent and significance of such impacts cannot be easily determined (Swaziland Government 2000). Immediately after the establishment of the SEA, in April 1996, The Minister of Natural Resources and Energy, in consultation with SEA, gazetted environmental regulations, popularly called the Environmental Audit, Assessment and Review Regulations. These regulations established guidelines and requirements for environmental impact assessments and environmental audit reports. In addition, in 2003, the 2002 Draft Environmental Management Act became law (Swaziland Government, 2002 and Swaziland Environment Authority, 2005).

Glasson *et al.* (1994), Fuggle and Rabie (2000), Glasson *et al.* (2001) and Kemm (2004) outlined some of the important purposes of the EIA process. The steps taken when undertaking the EIA process are outlined by Glasson *et al.* (1994; 2001), and by Fuggle and Rabie (2000). Public participation as one of the steps in EIA is defined as a process that leads to a joint effort by stakeholders, technical specialists, authorities and project proponents who work together to produce better decisions than if they had acted independently by addressing the process objectives of a project (CSIR, 2001). It is useful in determining the scope of the EIA; providing specialist knowledge about the site; evaluating the significance of likely impacts; proposing mitigation measures; ensuring that the environmental impact report is objective, truthful and complete; and monitoring any conditions of development agreement (Glasson *et al.*, 2001). According to Kuntala (2004), the role of citizen participation in decision-making and governance is to remedy social injustice through some redistribution of political power.

Why Public Participation?

Del Furia and Wallace-Jones (2000) noted that the importance of public involvement lies in: understanding the perception of proposed activity; resolving conflict and reaching consensus; identifying interested parties and their concerns and values surrounding the proposed development; collecting information about the local environment and the local community; defining problems and issues that should be addressed in the EIA (scoping); identifying alternatives, validating the quality of the Environmental Impact Statement (EIS) and obtaining feedback about the quality of the proposal; and informing and educating on the project, the consequences and the decisions.

METHODOLOGY

A descriptive design (Uys and Basson 2005) was adopted for the study and a quantitative (WARFSA, 2002) approach for data collection was employed. All stakeholders in the four administrative regions of the Kingdom where development projects are taking place or being proposed were targeted. Convenient sampling was used to draw 293 stakeholders (72 from the Hhohho, 78 from the Lubombo, 69 from Manzini and 74 from the Shiselweni regions respectively) that are considered to be affected or interested in such development projects.

Interview schedule, secondary data checklist, observation checklist, and a diary were used to collect data. A focus group discussion was held with 25 selected experts in order to draw up a list of items considered crucial to establish the obstacles/huddles that could be hindering public involvement in the EIA process in the country and the information generated was used to develop the data collection tools mentioned above.

A panel of six experts (four from UNISWA and two from SEA) was used to review the interview schedule and attest to its content validity. The interview schedule was field tested on a conveniently drawn-up sample of the stakeholders at Mbabane to determine its validity and the information gathered was used to update the tool. The observation checklist and diary was used to record anecdotes during visits to scoping meetings that were held during the study period to ascertain public attendance, participation, and involvement during the scoping meetings. Informal discussions were also held with the few people who happened to attend the scoping meetings to try and establish some of the factors that hinder public involvement. The secondary data checklist was used to record data from reports and other documents on public participation in the environmental decision-making process in Swaziland. Checking all information collected for completeness on a daily basis also ensured the data quality. The data was analyzed by use of a computer package (Microsoft Excel XP).

RESULTS AND DISCUSSIONS

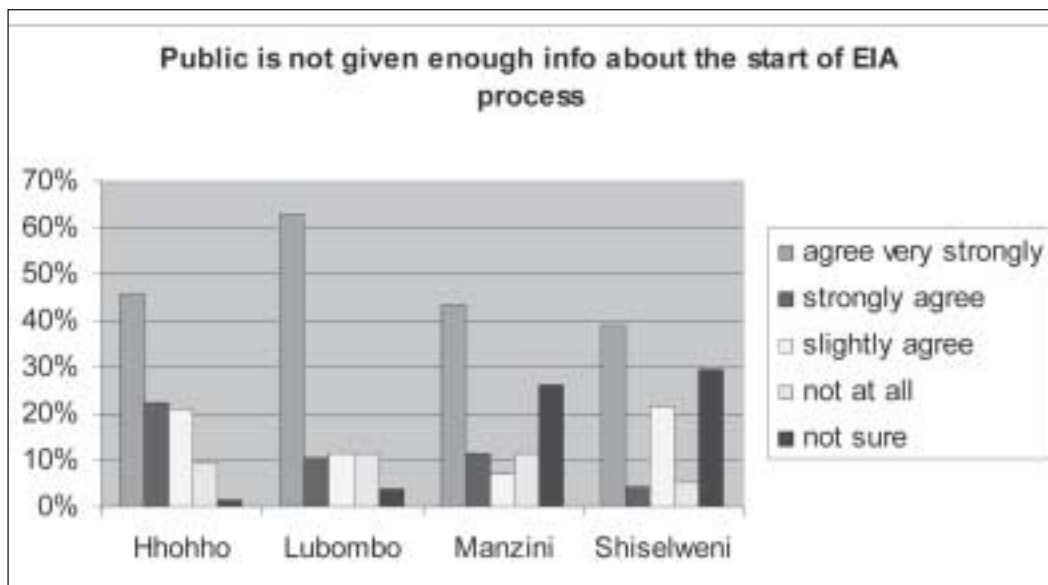


Figure 1. Public is not given enough information about the start of the EIA process

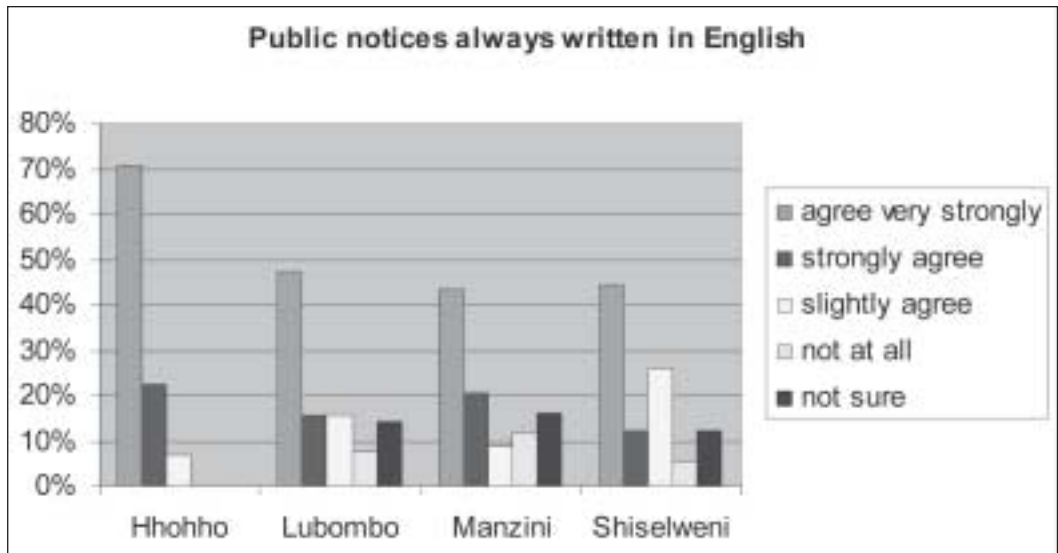


Figure 2. Shows whether public notices are written in English

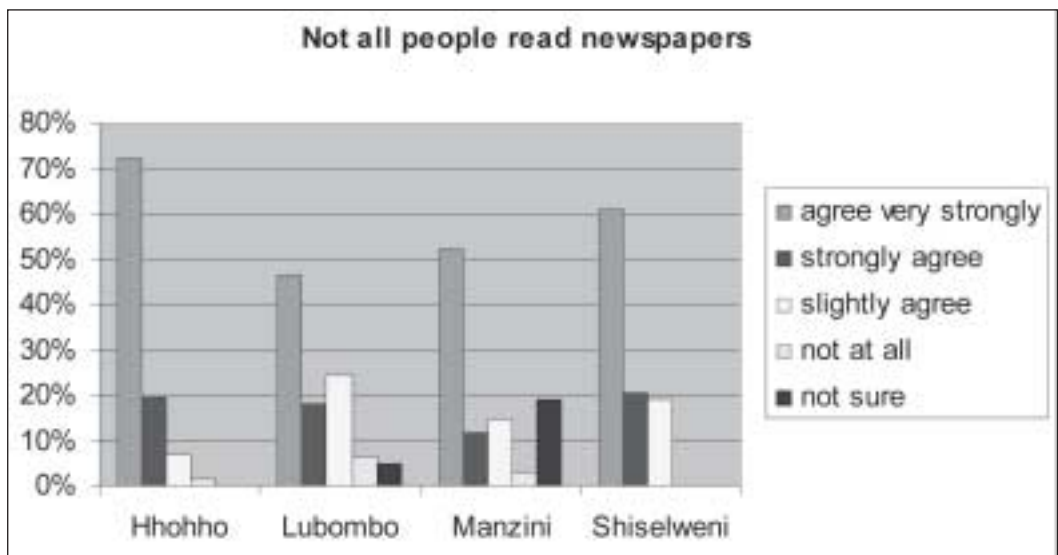


Figure 3. Shows that not all people read newspapers

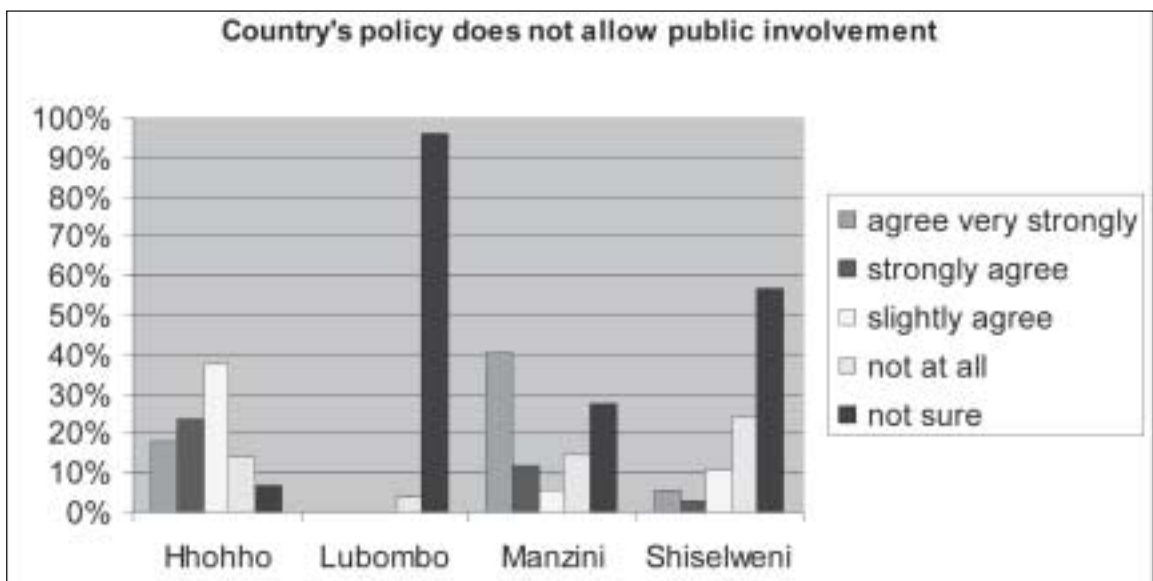


Figure 4. Shows whether the country's policy does not allow public involvement

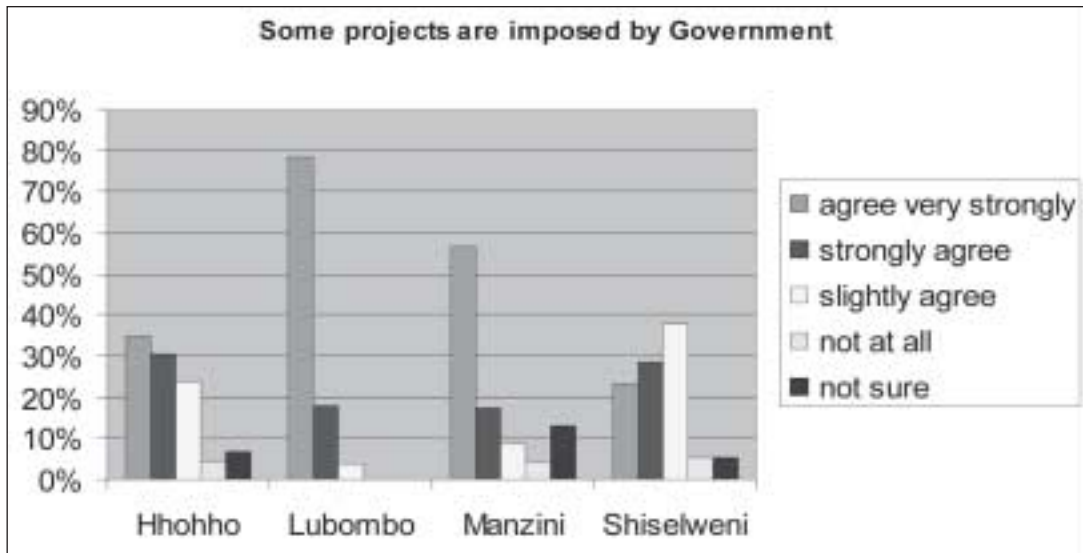


Figure 5. The Government imposes some projects

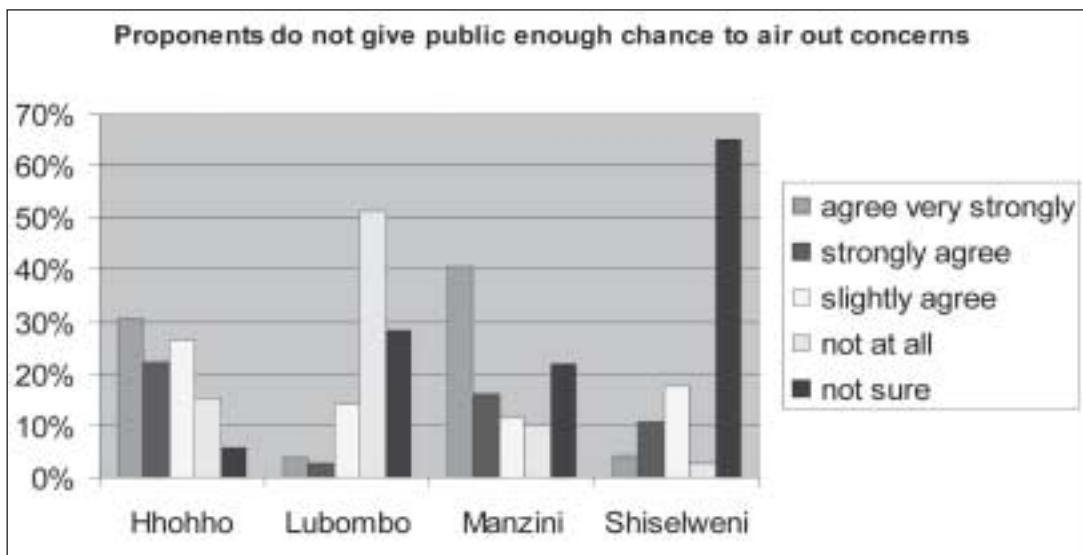


Figure 6. Proponents do not give public enough chance to air out their concerns

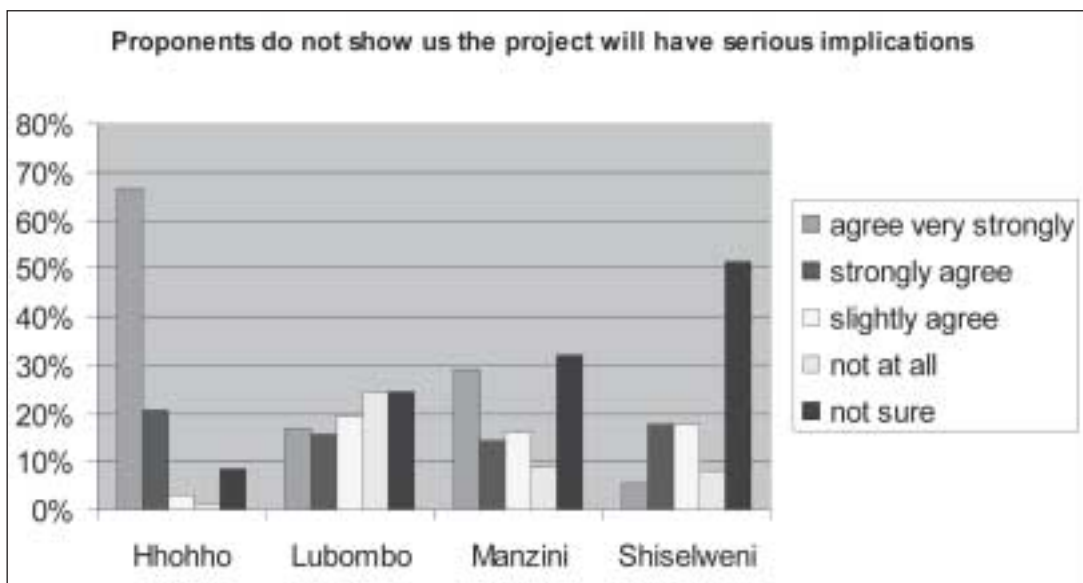


Figure 7. Proponents do not show the project's negative impacts

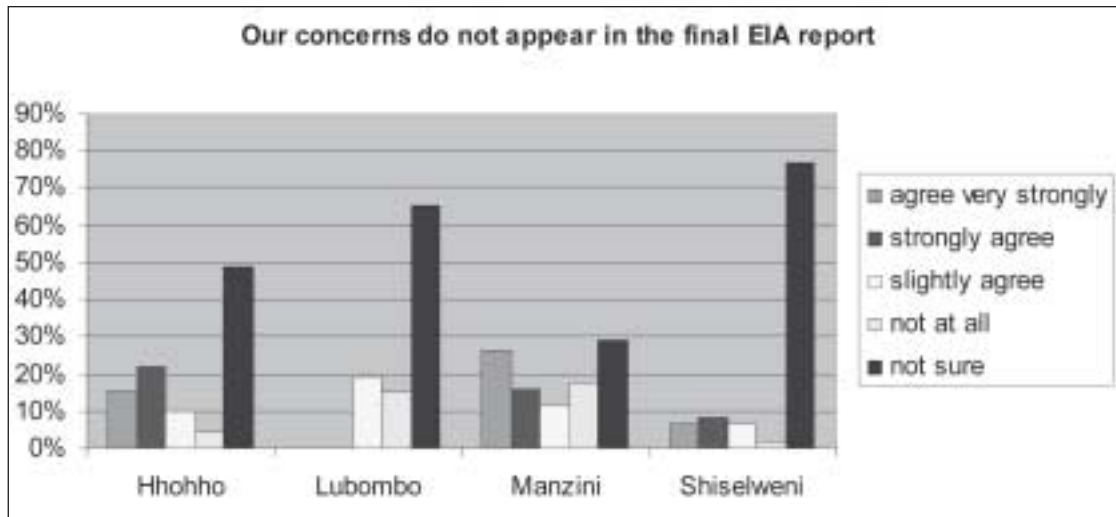


Figure 8. Our concerns do not appear in the final EIA report

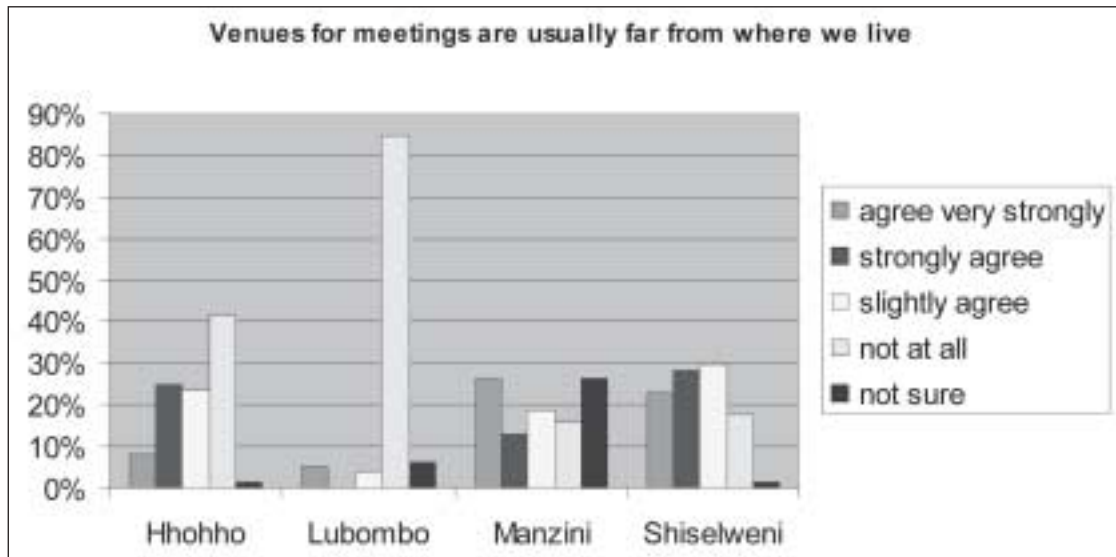


Figure 9. Venues for meetings are usually far from where we live

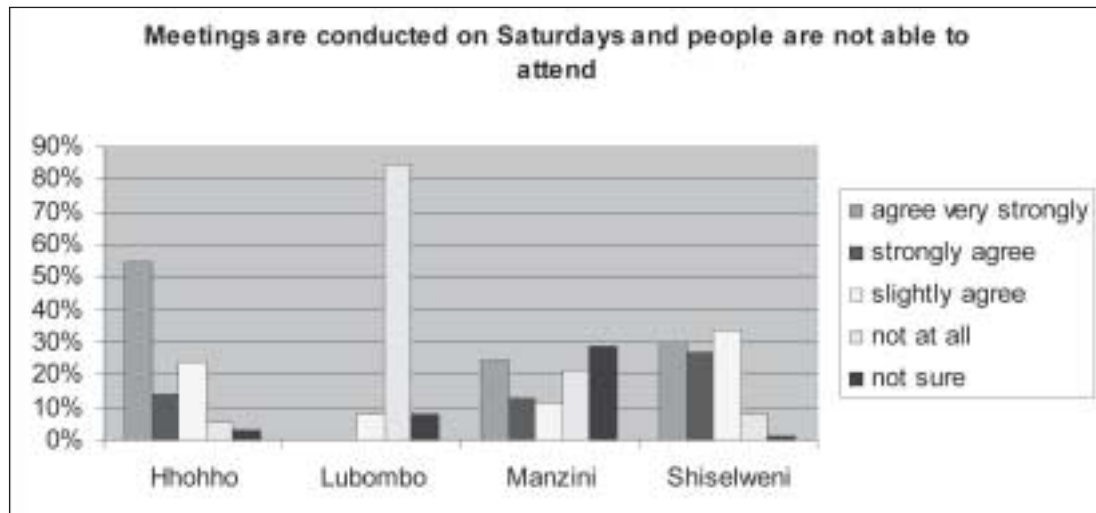


Figure 10. Meetings are conducted on Saturdays and people are not able to attend

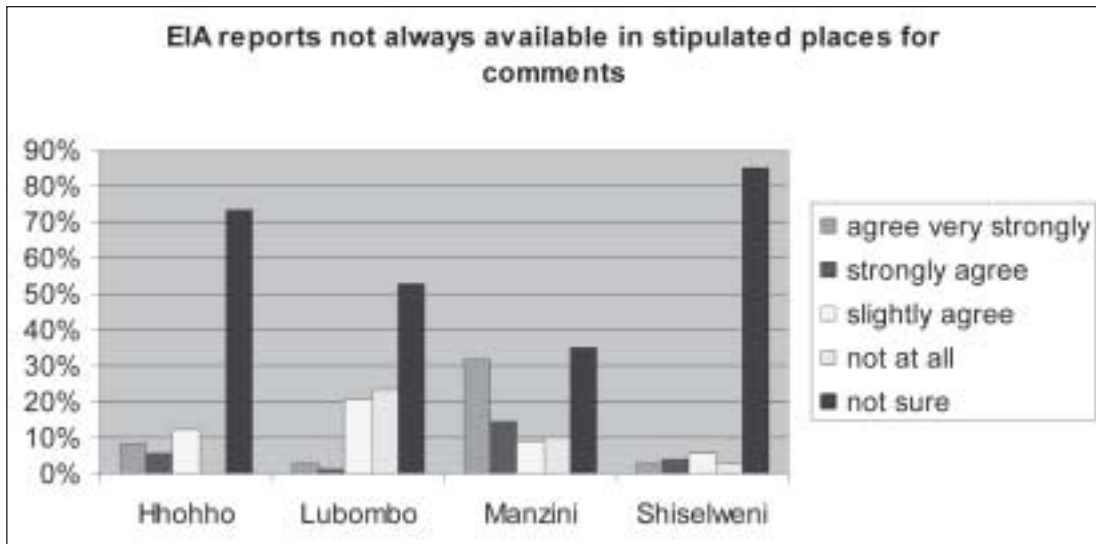


Figure 11. EIA reports are not always available in stipulated places for comments

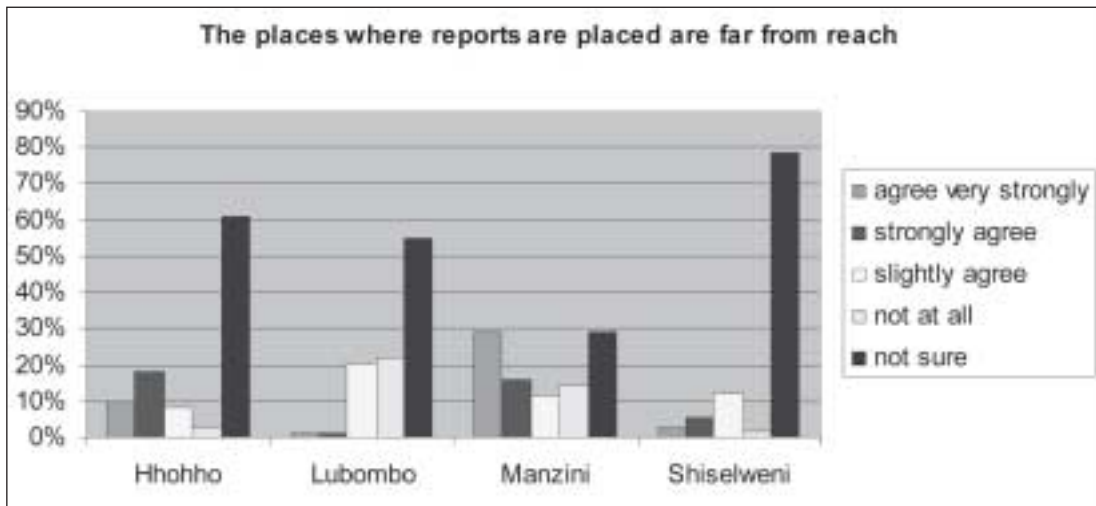


Figure 12. The places where reports are placed are far from reach

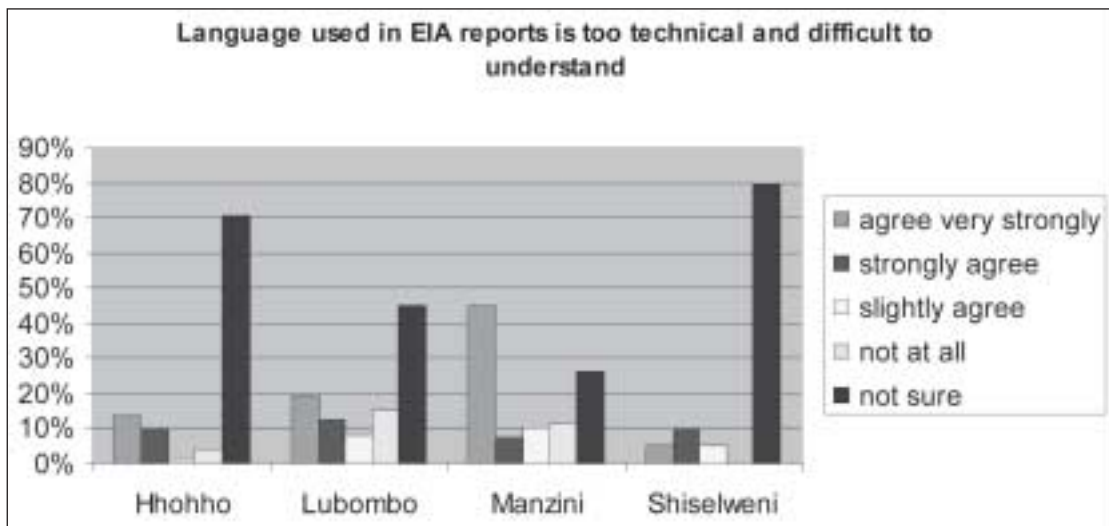


Figure 13. Language used in EIA reports is too technical and difficult to understand

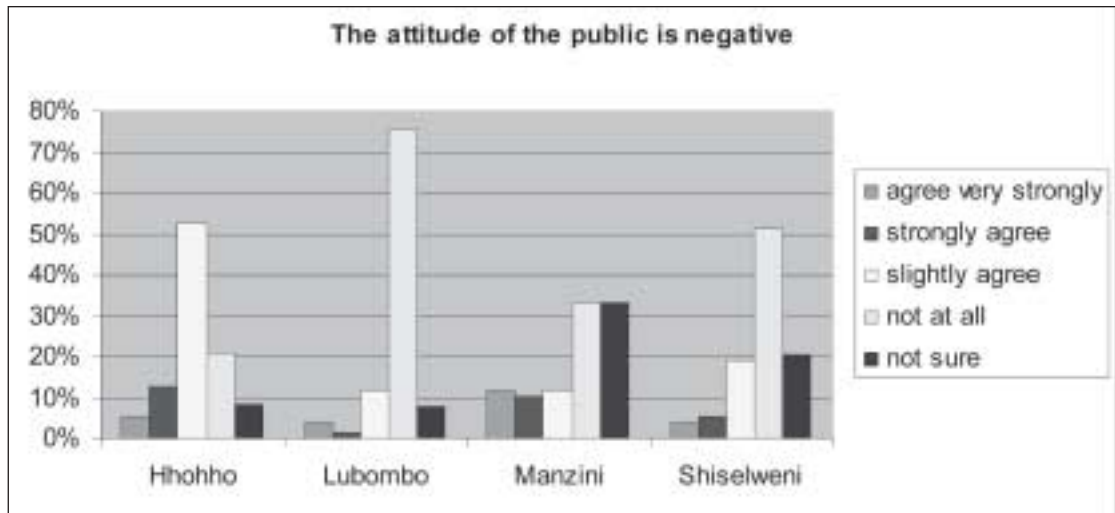


Figure 14. The attitude of the public is negative

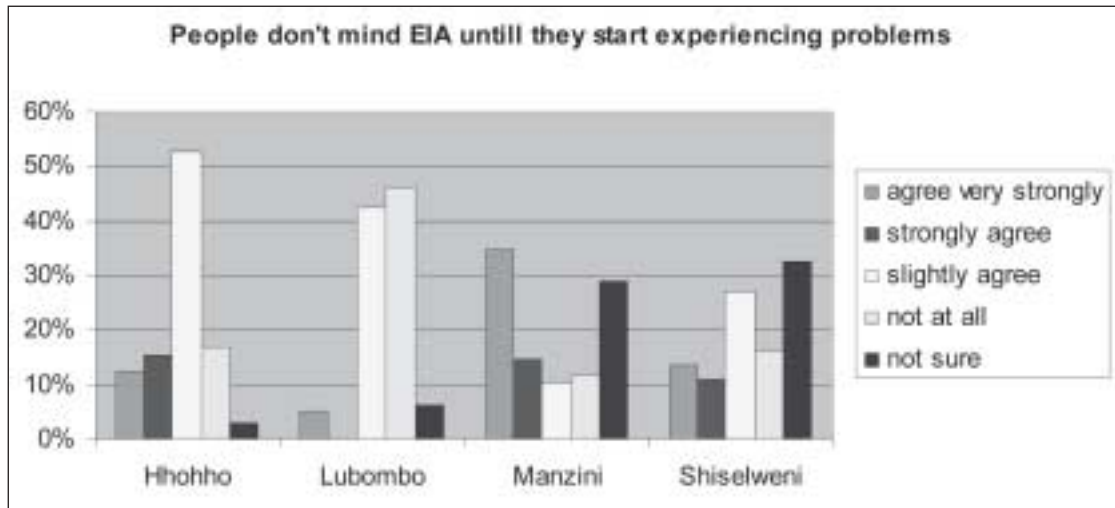


Figure 15. People don't mind EIA until they start experiencing problems

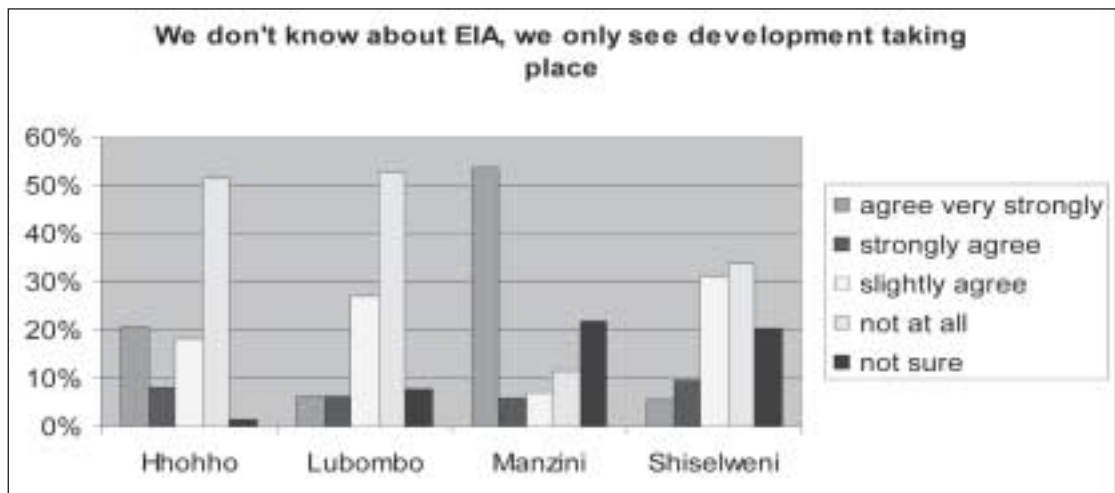


Figure 16. We don't know about EIA we only see development-taking place

CONCLUSION

The study revealed that, the major factors that constrain the process are:

- the public is not given enough information about the start of the EIA process;
- the public notices are always written in English;
- EIA meetings are only advertised in the newspapers;
- some projects are imposed by Government;
- the proponents do not give the public enough time to air their concerns;
- proponents do not present projects such that the public can see the forthcoming impacts;
- the majority of the people also do not read the final EIA reports;
- the distance from where the affected people live and the fact that the meeting are held on Saturdays also hinder the process;
- the EIA reports are seldom in the stipulated places for comments and again the distance to the places where the reports are to be found constrains the process; and
- the public is disinterested in the EIA process and only react when they see development impacting on them;

RECOMMENDATIONS

The Swaziland Environmental Authority (SEA) should conduct capacity building campaigns in order to sensitize the Swazi Nation on the importance of EIA and the crucial role people play in shaping up development projects. In addition, SEA should require proponents with their consultants to empower the affected parties with information about the upcoming development projects so that they can participate objectively.

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ASSESSMENT OF THE CHALLENGES OF HEALTHCARE WASTE MANAGEMENT ON WATER RESOURCES IN SWAZILAND

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ABSTRACT

Healthcare institutions produce a wide range of wastes most of which are disposed of in an indiscriminate manner thus posing a danger to water resources. The fact that these wastes originated from an infected person explains why they should be handled with extreme care and not disposed of close to water sources. The types of healthcare wastes generated in the country include: Biological (anatomical parts, placentas); Infectious (swabs, bandages, tongue depressors, cultures, specimen containers); Sharps (needles and both surgical and ordinary blades); Pharmaceuticals (drugs and drug containers); and Chemical (lab chemicals and X-ray contrast media, mercury). In most cases, these are either dumped in open dumpsites or on a landfill that are quite often close to water sources. A study was done to assess the challenges posed by healthcare wastes on water resources in Swaziland. A stratified convenience sampling procedure was adopted to draw fifty-six health-care centres into the study sample and face-to-face interviews were conducted with key personnel involved with the management of healthcare waste and also physical observations of disposal sites were undertaken. The study revealed that there was no strategy that the country has adopted for handling healthcare waste at all levels from generation to disposal thus risking the contamination of water sources. The study revealed that the Swaziland water resources are facing a critical risk from improper handling of healthcare waste. It recommended the immediate drawing up of a comprehensive action plan involving all stakeholders to rectify the situation. The legislation pertaining to handling of healthcare wastes also needs to be reviewed and guidelines for handling these wastes need to be developed. There is also a need for establishing an education programme to empower the health providers with skills in handling healthcare wastes.

Key Words: healthcare waste, incineration, leachate, water resources, seepage,

Target sub-theme: Water and People
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INTRODUCTION

Many countries including Swaziland have expressed an increasing awareness about the impact of human activities on the environment. One such area that is gaining increasing attention is the management of health care waste disposal and its implications on water resources contamination. The management of wastes arising from health care establishments is a matter of continuing concern not only to workers in the waste industry, but also to the general public at large. These concerns are based upon the potential spread of infections, the risks of injury, chemical toxicity, aesthetics, water pollution, and environmental pollution. In articulating matters of proper health care waste management, it is important that the medical profession, nurses, laboratory staff and all those who deal with health care waste adopt procedures that would minimize risks to the water sources, environment, public, fellow workers and people working in the waste industry.

The recently gazetted Swaziland Waste Regulations of 2000 in Swaziland Environment Authority (SEA) (2005) defines health care waste as any waste generated by hospitals, clinics, nursing homes, doctors, consulting rooms, medical laboratories, medical research facilities and veterinarians which are deemed to be infectious or potentially infectious. The researchers attempted to go further by recognizing other sources of health care waste from such groups as traditional healers and birth attendants who form quite a sizeable group of health care waste generators in Swaziland.

Because of the marked increase in HIV/AIDS infections, coupled with the emergence and/or re-emergence of new diseases and strains the amounts of waste generated has also increased mainly due to rapid population growth and increased infection rates. These have partly contributed to a general increase in the number of patients visiting medical facilities, leading to increased pressure on resources including how to dispose of the resultant waste. The problem is further exacerbated by the fact that there is a growing trend towards home-based health care, with patients being sent home earlier from the hospitals resulting in health care waste being disposed of at home. This poses a significant health risk as it brings to the fore a different dimension of the problems faced in managing health care waste.

Given that health care waste is sometimes disposed of on landfills, the potential of it ending up contaminating water sources and the environment in general with grandiose health implications makes it imperative that measures be put in place to arrest the situation before it gets out of hand. The research

therefore aimed at identifying the types of health care wastes generated by health care institutions and how they are managed.

Since health care waste often contains one or more pathogenic organisms, given that it is generated from infected individuals, it is important that it is properly handled. Objective observations at the health care facilities in Swaziland showed that most of the waste is collected and placed in containers, awaiting transportation. This can easily encourage transmission of diseases with dire national consequences. Proper health care waste management requires that; health care waste is contained in a manner that is not offensive and minimizes the threat to health and is stored in well-secured containers, so that it minimizes the threat to health, safety and the environment. In addition, there should be an assurance that all the waste will be destroyed by incineration. Further more, all necessary equipment required to clean and disinfect the area in case of accidental spillage is easily available and accessible and that this waste does not get into natural water bodies.

Miller (2002) points out that most pollution of our water bodies is through human activities and occurs in or near urban and industrial areas where there is a concentration of pollutants. This raises concern since many people are thus subjected to high health risks due to the health care wastes. Review of international legislation indicated that the international community is aware of the need to control introduction of health care wastes in the environment. For example, the UK has in place "Health and Safety Act 1974" and "Control of Substances Hazardous to Health Act (COSHH, 1998) (Ayliffe et al., 1999). In the USA the Environmental Protection Agency (EPA) and the Food and Drugs Authority (FDA) are addressing the discharge of pharmaceutical chemicals into the environment. Rogers et al., (2001) state that EPA also sets standards for operation and performance of incinerators in order to limit emissions of certain toxic pollutants into the environment which very often end up in water bodies.

According to SEA (2005) Swaziland has in place the Swaziland Environment Authority Act 2000, the Swaziland Water Act 2000, and the Swaziland Environmental Management Act 2002 in which there are regulations governing the management of Health Care Wastes. In the Swaziland Environment Authority Act 2000, for example, sections 18 and 25, stipulate the colour coding of health care waste containers e.g. untreated wastes have to be put in red heavy duty plastic bags. The regulations again stipulate that sterilization of all clinical wastes is

mandatory. The training of staff in proper management of health care wastes is mandatory. Violation of these provisions constitutes a legally punishable offence.

According to WHO (1993) the current environmental problems that may have adverse effects on health, surpass any that have previously been experienced. The fact that health professionals and authorities should pilot all efforts to improve the environment has been stressed. They should also inform governments of the implications of development policies on health and environment (WHO 1993).

According to Krishnamoorthy (1992) hospitals also produce outdated drugs and other chemical wastes. These wastes often pose problems to humans, other organisms in the environment, and water (Potera, 2000). WHO (2000) identifies other impacts such as the spread of sometimes-resistant microorganisms in the environment and injuries like radiation burns and sharps inflicted injuries. WHO (2000) further mentions the risk of poisoning through the release of pharmaceutical products such as cytotoxic drugs and antibiotics into the environment and thus water.

Mercury is a potentially toxic heavy metal, which occurs naturally in the environment in small quantities. This heavy metal enters the environment mostly through human activities that include medical and dental activities. The human body more readily absorbs methyl mercury, which is an organic mercury compound, more than elemental mercury which is a product of mercury transformation in water bodies by microorganisms. It is commonly ingested by eating fish from contaminated waters. Mercury is a neurotoxic pollutant and has an affinity for brain tissue and interferes with brain development. It can also cause cancer and damage the gastrointestinal tract and the lungs. According to UNEP et al., (2002), pregnant mothers have to be given special protection against adverse effects of the environment since unborn children can suffer from permanent damage due to exposure to chemicals such as mercury.

Mafatle (2001) has indicated that one of the major sources of Mercury in Lesotho is waste from Health Care Establishments. The assumption here is that, long-range transport of mercury is through air, in the form of elemental mercury vapour that travels long distances from sources. Mercury is highly persistent and accumulative in the environment and can be deposited onto soil, water, plants and animals as organic and inorganic compounds. The sources of mercury in Swaziland include, among others, incineration of health care waste, wastewater from

various dental fillings, laboratories, and indiscriminate disposal of health care wastes. Miller (2002) has cited many examples (of radioisotopes, their uses, type of radiation they produce, and their half-life) that are used in the medical facilities. The processing of these wastes merely transforms them from one physical form to another. Swabs and dressings may be radioactive though mostly it is at low levels and can be disposed of directly without safe storage to allow decay. Radiation from heavily contaminated swabs, dressings and bed linen can be measured and be released only after adequate retention time. According to the International Labor Organization (ILO) (1976), the environment can absorb certain amounts of radioactive wastes without any harmful effects but amounts may easily exceed safe levels thus becoming hazardous to both the environment and man.

According to WHO (2000), bacteria resistant to antibiotics and disinfectants exist in health care wastes and these contribute to hazards created by poorly managed wastes. The wastes may also contain anatomical wastes that the general public is very sensitive about. Without proper management, these wastes find their ways to water bodies. According to WHO (1999), care should be exercised when choosing a method of waste treatment. To render the waste safe, several factors should be considered. Some of the factors are health and environment, disinfection efficiency, type and quantity of wastes, treatment options available, and appropriateness of technology, infrastructure and regulatory requirements and public acceptability of the treatment option chosen.

Treatment methods may have certain qualities like reduction of infection hazards but may release some harmful emissions to the environment. Waste containing certain substances may release toxic substances when incinerated under insufficiently high temperatures, e.g. those containing chlorine and heavy metals. UNEP et al., (2002) cites that, children are exposed to pollutants from infancy and thus throughout the child's lifetime. They are at higher risk of pollutants and pathogen intake because of their higher intake of air, water and food per unit body weight as compared to adults. In addition, mothers can be exposed to harmful chemicals that might affect the foetus, like in the case of exposure to heavy metals for example mercury or lead which they may get from drinking water. Such exposure may lead to birth defects, foetal growth retardation, and mental retardation and development disabilities. HIV/AIDS infected people have a weakened immune system and thus are more vulnerable to infections than other population groups. Women are said to constitute a high percentage of scavengers

thus are being exposed to harmful wastes such as health care wastes (WHO 1995).

Incineration is one of the ways of treating wastes. According to WHO (1999), incineration, a high-temperature dry oxidation process, reduces organic and combustible wastes. Incineration however, has some shortcomings. Some types of wastes like pressurized gas containers; large amount of reactive chemical wastes, silver salts and radiographic wastes should not be incinerated (ILO, 1976). According to ILO (1996), fumes may arise from stacks of incinerators and care should be taken to prevent these fumes from entering buildings and the environment. Apart from fumes, particulate matter and fly ash can be released into the atmosphere and end up on the land and water. WHO (2000) warns against incinerating materials that contain heavy metals or chlorine. ILO (1976) states that radionuclides pose a special environmental problem when they have to be treated by incineration or any other method.

Manahan (2000) cites that, hazardous substances that include noxious gases are produced when there is inadequate combustion. Under oxygen deficient combustion, some of these substances are acted upon by enzymes to produce carcinogenic metabolites. The issue is also the concern of WHO and UNICEF (2000) who mention the importance of maintaining adequate temperatures by pointing out that certain temperatures have to be maintained in order to render the wastes sterile. Temperatures below 400°C which can be acquired in open pits, brick burners or in drum burners are not sufficient to achieve complete combustion and do not guarantee sterilization. Temperatures above 1000°C, even though they still produce toxic pollutants like heavy metals, dioxins and furans, are needed to ensure sterilization of used needles and syringes.

The Canadian Centre for Pollution Prevention (CCPP) (2003) states that, in order to minimize adverse effects of pollutants, incinerators should be fitted with pollution control devices. These control devices should be able to reduce public health risks that arise from inhalation of toxic emissions and particulate matter that can be ingested through food or water. In addition, for incinerators to function properly, a well-trained workforce is needed. Residue from incinerators, whether low temperature or high temperature incinerators, has to be carefully handled, transported and disposed of in designated and controlled sites to avoid water and environmental pollution. Some types of health care wastes contain polyvinylchloride (PVC) which when burned release dioxins and furans. Dioxin is labelled "the most toxic chemical" by the Isipingo

Declaration (2002) which further calls on governments to close down all incinerators and replace them with new technologies. Not all incinerators are equipped with pollution control devices. CCPP (2003) states that, to counter the adverse effects of such conditions, health care wastes can be reduced and alternative methods of waste treatment like autoclaving employed. Weinhold (2001) has cited that, there are moves to reduce dioxin emissions by reducing the bulk of health care wastes by several means such as reusing sharps containers and separation of hazardous and infectious wastes that can also be complemented by the use of non-incineration methods of waste treatment.

WHO (2000) says that, apart from dioxins and heavy metals production, the incineration of health care waste also produces formaldehyde, benzene and vinyl chloride because of the variety of materials in health care activities. Greenpeace (1996) in its deliberation on incineration contended that even the costs of reducing releases from the incinerators are high and that developing countries lack the needed resources to regulate and oversee an incinerator and its residue. It further states that, incinerators are not in line with sustainable waste management but instead encourage waste generation since they depend on waste to operate.

According to WHO (1999), health care wastes should not be allowed to accumulate in the health care facility premises since they pose a higher risk of transmission of infection than disposal in a landfill. Landfill disposal is the acceptable method to employ when there is no proper means of waste treatment but it may pose risks of contamination of surface and groundwater. This holds true even when engineered landfills are used. In addition, landfills should be properly located and far from water sources. The site should be well managed and personnel should be in place to supervise the disposal of wastes in divided manageable phases. According to WHO (2000), landfill sites may be sources of air and surface water contamination. Goehl (2000) says that, the direct effects of pollutants from landfills have not yet been measured. There are insufficient studies of landfill sites but studies conducted on people living next to landfill sites have suggested that there are increases in adverse health effects such as birth defects and certain cancers which may be attributed to poor health care waste management. Self-reported cases of headaches, fatigue, and sleepiness among people living close to landfill have also been reported. These may be due to toxic effects of chemicals found on site. Vrijheid et al., (2002) concluded that people who live near landfill sites have higher chances of bearing children with chromosomal

defects. In addition, hazardous wastes may migrate to groundwater and other water bodies from the site.

The EPA points out that, the effects of active pharmaceutical ingredients where concentrations are less than 1ppb in the environment are negligible. Pruss et al. (1999) recommend that, cytotoxic and narcotic drugs should not be disposed of on landfills or discharged into sewerage systems. The dilution and subsequent discharge into sewers of large quantities of pharmaceuticals is also not recommended because these may end up in surface or ground water. The storage facilities that should be inaccessible to unauthorized persons, animals and birds, should have easy to clean floors. However, the storage should be within easy reach of cleaners and waste collectors and there should be adequate water supply for cleaning the storage area and for personal hygiene of workers. In addition, it is recommended by Pruss et al. (1999) that there should be put in place adequate supply of cleaning material, protective clothing and waste containers within reach. The storage space should also be protected from the sun. However, the wastewater generated from this activity should not be allowed to get into natural waterways.

For the transportation of the health care waste, Pruss et al. (1999) suggest that easy to load and easy to clean carts that have no sharp edges for on site transportation should be used. For transportation from site of generation, they recommend packaging and labelling should comply with international standards. The internal finish of vehicles should have a system for securing load during transportation, have rounded internal angles and be made of material that is easy to clean and sterilize. They should have separate compartments for storage of protective clothing, cleaning equipment, tools and disinfectant, empty plastic bags, and special kits to deal with spills.

WHO (1999) recommends that there should be proper training of workers to ensure that workers know of and understand and appreciate potential risks they and the environment are faced with when handling health care wastes. The training should be inclusive of all waste handlers within and outside health care facilities. Winds (2002) says that, the training should include epidemiology and symptoms of blood borne diseases and modes of transmission of pathogens (of which water is one), knowledge of control plans, and training on procedure in cases of exposure.

METHODOLOGY

The study used quantitative method for data collection. Face to face questionnaires were used.

ENVIRONMENT AND HEALTH INTERNATIONAL

Swaziland is divided into four administrative regions of Hhohho, Manzini, Lubombo, and Shiselweni. A total of 56 questionnaires were administered to respondents in the Hhohho, Lubombo, Manzini and Shiselweni regions respectively. The data collection process also entailed on-site visits to observe the types and quantities of health care waste generated and the management practices thereof. This included oral interviews with administrators, doctors/nurses in charge, grounds men, traditional healers, and traditional birth attendants at generation and waste disposal sites respectively. In addition, an inspection of the surrounding areas and facilities at the disposal sites was carried out. Where there was an incinerator, an inspection was also done to ascertain compliance with standards.

There was a total of 16 data collectors collecting data over a period of fourteen days. The data was

collected from eight different hospitals, four health centres, eleven clinics, five different private surgeries per region, ten traditional healers per region, with an average distance apart of 50km and five birth attendants per region within an average distance between of approximately 50km. Given that the questionnaires were self-administered, a response rate of 100% was achieved which is quite representative. The data were analyzed using Microsoft Excel (Microsoft, 2003).

RESULTS

The types of health care wastes generated ranged from biological (anatomical parts, placentas); infectious (swabs, bandages, tongue depressors, cultures, specimen containers); Sharps (needles and both surgical and ordinary blades); pharmaceuticals (drugs and drug containers); and chemical (laboratory chemicals, X ray contrast media, and mercury).



Picture 1.
Remains of incompletely burnt health care waste next to a water source



Picture 2.
Health care waste in an open dumping site

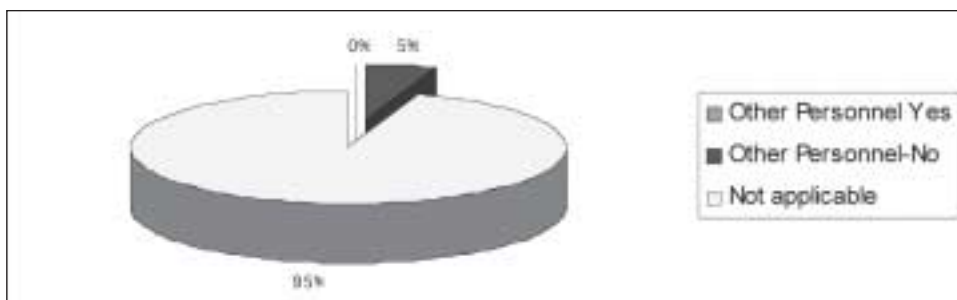


Figure 1. Training in handling waste

On the question whether other medical personnel had any training on handling of health care wastes, 5% indicated that there were no other personnel trained to handle health care waste while 95% indicated that the question was not applicable to them. In general, all of the other medical personnel interviewed had no training on health care waste management. This is dangerous as it could lead to undue infections due to injuries or contamination and unsanitary disposal of these wastes near water bodies as indicated in Pictures 1 and 2. Winds (2002) said that, the training should be inclusive of all waste handlers within and outside health care facilities. He further stated that, the training should include epidemiology and symptoms of blood borne diseases and modes of transmission of pathogens, knowledge of control plans, and training on procedures in cases of exposure.

Asked about the frequency of training and at what level, 5% indicated that they received initial training on handling waste, while another 5% indicated that they received both initial and refresher courses. However, 90% did not find the question applicable. This is of concern because most of the people involved in the exercise are grounds men who are mostly illiterate. It exposes them to the dangers of infection. WHO (1999) recommends that there

should be proper training of workers to ensure that they know, understand and appreciate potential risks they are faced with when handling health care waste. An instance was observed in one of the health facilities in the Southern Hhohho where an incinerator operator said that they were told during the initial training that they should keep the incinerator temperature at a certain degree. This is not always true since the different categories of health care waste according to literature, require different temperatures for effective incineration. This implies that some of the wastes are only partially incinerated and find their way to the dumpsite where the final fate remains questionable (Picture 2). An instance was also observed in one of the facilities in the Manzini region where partially burned human parts were seen at the final dumping site.

On record keeping (Fig 2), about 98% either said the question was not applicable (78%) or they were not keeping records (20%). Only 2% indicated record keeping. This anomaly was probably due to the fact that all the traditional healers and birth attendants knew nothing about the importance of record keeping. Some of the rural health centres had no record keeping mechanism in place. The implication here is that no proper monitoring of waste, could lead to environmental and water contamination.

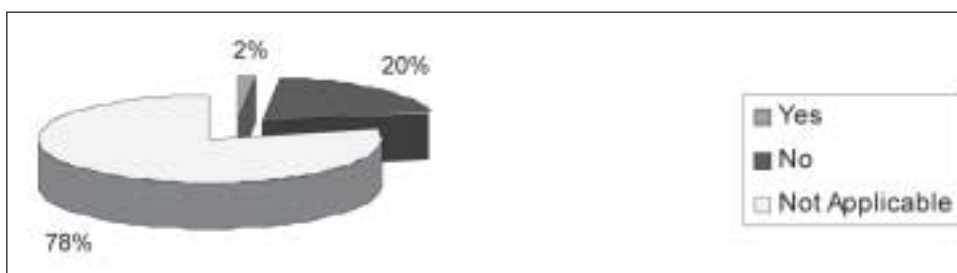


Figure 2. Records of Waste

Nine percent of the respondents indicated that, no records were being kept at the loading zone while an overwhelming 91% could not tell the applicability of this question. This means that, most of the wastes go to the dumping sites with no record left behind. It is interesting to see that not a single facility responded yes to this question. The danger here is that, whatever waste went to the dumpsite cannot be

traced for environmental and water contamination and safety or health reasons.

Respondents were asked if the receptacles for health care waste were easily identifiable. All the respondents said that health care waste receptacles were not easily identifiable. This probably is due to the fact that in most cases the wastes go to the

dumping site together with the general municipal waste. This poses danger to scavengers who normally collect some of the reusable waste from the municipal waste that makes the bulk of all the waste dumped at the site. At the Mpholonjeni tip site, the health care waste is generally placed under a roof, which is not secure waiting for tipping day. The waste is generally visible and in some days rots there. In one of the Government hospitals the wastes are left in dustbins out side next to the wards and people sit and eat next to them. The waste is very identifiable as one could see bandages, syringes, dirty linens, urinary bags, etc mixed together in the dustbins and some on the ground. The same observation was seen on two of the dumping sites in the country (Pictures 1 and 2).

On storage of health care waste, about 90% said the question was not applicable to them. 5% said they store their waste before disposal. There was a case in one of the private clinics in Manzini where the waste was found rotting at the storage area which was not secured and near residential area and a river flowing by. This could easily encourage spread of diseases due to flies and other vectors and contamination of water bodies. This can also pose risk to children, dogs, and scavengers. The storage places should be made secure from any adverse environmental conditions such as rain, sun, and wind.

Respondents were asked whether they provide facilities to store health care waste. About 89% of the respondents said the question was not applicable,

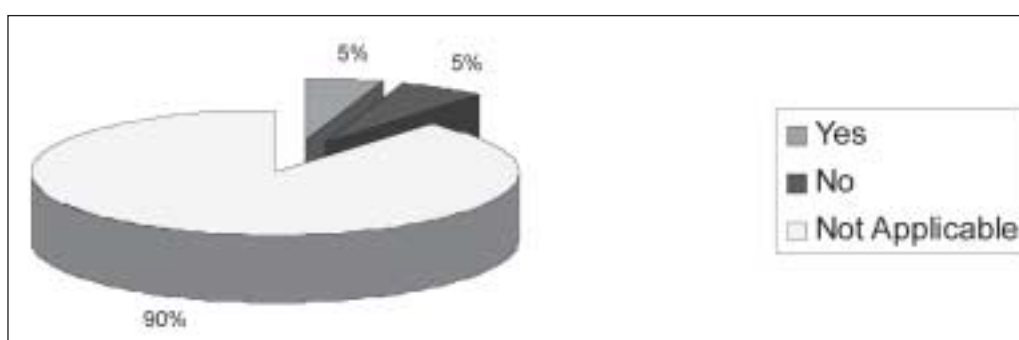


Figure3. Shows storage of health care waste

4% said they didn't provide storage facilities for health care waste and 7% said they did provide storage facilities. The indication here is that the majority of the health facilities do not provide facilities for health care waste storage.

The study revealed that, most of the facilities disposed of their waste either by incineration or land filling. Probably these are the only cheap methods of doing so. It was observed that, the incineration was either done out side in the open, or using a proper incinerator. Those disposed by land filling were either done at the municipal tip sites or at an open dumpsite, or onsite in pits. This poses danger to both surface and groundwater resources. The traditional healers and birth attendants used pit latrines or dug a pit in "secure" secret places. When asked to show these places, the healers and birth attendants indicated that they could not due to their (omit some) traditional beliefs. However observations showed that these are often buried in bushes that happened to be close to surface water sources.

When the respondents were asked to classify their landfill site, the answers varied and included open pit, incinerator, burial at home, uncontrolled landfill, or pit latrines. This clearly indicates that the nature of health care waste disposal out there is not up to standard. Asked whether facility was registered or

permitted, 42% said that it was not permitted, 8% said it was permitted, 8% said it was registered, and 42% said it was not registered. The impression here is that, an overwhelming 84% said the landfill was neither registered nor permitted. The implication here is that, there is no monitoring of (omit what exactly could be the fate of the) health care wastes that are deposited in the landfill. The risk of surface and ground water pollution due to the leachate which is produced in these landfills is not known! Respondents were asked what measures had been taken to control air pollution. Most of them did not respond to the question while some indicated that one way through which air pollution especially from incinerators is being controlled is through installation of high chimneys. This could only solve the local problems but not those at some distance from the chimney and also imposes a potential for surface water contamination.

Asked whether other animals such as pigs, dogs, goats and cows gained access to the site, 9% indicated that they did while 11% indicated that, they didn't. Another 80% did not respond to the question. The animals can pick up health care wastes and end up leaving it in or near water sources thus causing contamination. The 11% that said animals did not enter the site said they prevented this by fencing. Asked as to how often animals gain access,

most of the respondents stated that they do so every day especially at night. Asked what measures have been taken in order to prevent animals from entering the site, a number of respondents stated that fencing the area had helped, while a number suggested putting the containers in a safe place as a means of deterring those who might want to get in to pick containers.

CONCLUSION

The study has revealed that, the health care waste management practice in the sampled population in the country is poor and that this poses a big risk of water contamination by health care wastes. Most of the waste handlers lack the necessary training. The treatment of health care waste by incineration is not satisfactory as in some cases there was evidence of identifiable wastes at disposal sites which were near water sources. Generally, the storage of the waste is not done properly and there is a general lack of facilities for proper storage.

RECOMMENDATIONS

Health care waste should not be allowed to accumulate in the premises of a health care facility. Training in waste management should be made available to all people involved in health care waste management (including scavengers). This training should include preparing policies on safe practice for managing health care wastes (generation storage, collection, transportation, treatment, and disposal) and avoidance of water contamination.

Waste should be disposed of using controlled landfill or properly managed incinerators.

Cytotoxic and narcotic substances and radionuclides should not be disposed of in pit latrines, sewage systems, or in landfills as this can result in water contamination.

All waste generators should segregate wastes at the generation point.

Color-code all containers of the particular classes of waste as recommended by the Swaziland Waste Management Act 2000. And also use special leak and puncture proof containers for sharps which should also be closed properly.

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2007 NEHA SABBATICAL EXCHANGE AMBASSADOR

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Sabbatical Goal

The overall goal of my sabbatical exchange was to study, observe and share information with colleagues in the field of environmental health while in England. During my three-week stay, this exchange was an opportunity to discuss, create, share ideas and concerns, establish new programs and develop procedures. In addition, it was an opportunity to set environmental health standards, implement new policies and programs, recommend enforcement actions and participate in the actual inspections and environmental duties.

Introduction

I am an Environmental Health Specialist and have been employed with the Cerro Gordo County Department of Public Health located in Mason City, Iowa, for the past 16 years. Mason City is located in north central Iowa and has a population of approximately 30,000, while Cerro Gordo County has around 47,000 citizens. Growing up on a farm south of Mason City, I appreciate the simple, rural living of Mason City and its surrounding communities. As I headed off to London, England, on 9 October 2007, I wondered what it would be like to visit, work or live in a city with a population of 7.7 million people. As I stepped off the plane after a 15-hour trip, all 7.7 million people were at the airport, or so it seemed. I followed all my instructions very carefully to catch the train, and then only take a “black cab” to the Union Jack Club. My host had written in my instructions, “We know what the black cabs are like and I think that they only have those in the taxi ranks.” Well, this all seemed simple enough, except I arrived at the wrong airport, my luggage was still travelling around the world, I had 5 minutes to catch the first train and as I queued in line for a taxi, they were red, silver and black. Not to panic at this point, I was assured by the young lady in line that it was OK to get into the next “red” taxi. With 15,000 hotels in London, surely the taxi driver would find my destination and 30 minutes later I arrived at my hotel, the Union Jack Club in London, England.

Overview

The United Kingdom (UK) consists of the countries of England, Scotland, Wales and Northern Ireland.

London, the capital city of England is a major tourist destination attracting 27 million visitors every year and will be host to the 2012 Olympics. London ranks as one of the most expensive cities in the world, alongside Tokyo and Moscow. London’s largest industry remains finance and at present, two U.S. dollars are equal to one British pound (£).

Ann Goodwin was my contact/host for this sabbatical exchange. Ann is a Principal Policy Officer with the Chartered Institute of Environmental Health (CIEH) in London and works on special projects such as pandemic flu, international policy, climate change and genetically modified organisms (food crops, etc.) She commutes by train to work, 2 hours door to door. Yes, each way. I am 10 minutes from my work, by car, if the stoplights do not turn red. Ann suggested that I probably would not want to hire an automatic (rent a car) while in England as they are expensive and they drive on the opposite side of the road. Some days, I have trouble driving on the “right” side of the road; I can’t imagine driving on the “wrong” side. Trains, taxis or walking were my transportation while in England.

The Chartered Institute of Environmental Health is a registered charity for the professional body of environmental health practitioners, with over 10,500 members across England, Wales, Northern Ireland and other parts of the world. The London headquarters is home to CIEH’s central management team, heading up the following divisions: Policy, Education & Professional Standards, Communications, Memberships & Information Services, Events, Training, Publishing & Finance, and IT & Administration. Ann provided a tour of the offices in London where I attended a Policy Development Board meeting on 11 October. Items on the agenda for discussion were the health effects from climate changes, food hygiene standards in hospitals, effectiveness of regulations, fundamental changes taking place in the way environmental health is delivered, private sewers, private water supplies, etc.

My sabbatical exchange was planned around attending the CIEH annual conference. I sent the required paperwork in the post and was accepted as an Associate member of the Chartered Institute of Environmental Health. The CIEH conference, “Best of the Best-Back to Basics,” was held on 15-16 October 2007 at the East Midlands Conference Centre, Nottingham. The city of Nottingham is the county town of Nottinghamshire in the East Midlands of England and the estimated population is 278,700. Nottingham is home to Robin Hood, Boots the Chemist, a pharmaceutical company and the birthplace of Raleigh Cycles.

Prior to the conference on Sunday, 14 October, Ann and I attended a workshop, Accelerated Learning, presented by David Newsum, a freelance training consultant. The workshop was informal and David is a very motivating, entertaining and musical trainer with guitar in hand. The workshop provided innovative solutions and a learning experience that closely matches the ways in which the brain works. The four P's of learning are prepare, present, practice and performance. As I teach ServSafe, food safety training in Iowa, it is always helpful to obtain new ideas and solutions to impact the students.

The new style conference, "Best of the Best," was aimed at all Environmental Health Practitioners (EHP) and the focus was to help practitioners address the problems and issues that they deal with on a day-to-day basis through access to information on best practices and networking opportunities. Graham Russell, head of the Local Better Regulation Office (LBRO) delivered the keynote address, "A vision for LBRO." The LBRO will act as a go-between with its most important task to make sure the UK is business friendly and not over regulated. In the coming year LBRO will be sorting out a programme of activity that will start to change the way regulatory services are delivered. LBRO will work with organisations like CIEH to ensure that a proper balance is struck between protecting consumers and ensuring businesses are helped to comply with the regulations. The objective of LBRO is to build a world-class regulatory system.

One of the sessions I attended was "Coventry Scores on the Doors." Coventry Council has been participating in a pilot programme for the past 12 months, with over 1500 businesses. Scores on the Doors schemes are raising standards of food hygiene. They bring food safety to the forefront and raise public awareness about the importance of food hygiene. Coventry Council uses a three star risk rating; they have a staff of 14 people and inspect approximately 32 food facilities per month. A rating is not awarded if major improvements are required or formal action is being taken, however the better the compliance, the better the star rating. The rating is valid until the next inspection, but may be withdrawn if standards are not maintained. A London-wide Scores on the Doors scheme was also announced, covering 80,000 food premises. Most participants felt it should be a national scheme and if approved by the Food Standard Agency (FSA), displaying ratings in restaurants could be made compulsory by the end of 2008. Cerro Gordo County Department of Public Health participated in a similar five star pilot project in 2001. The purpose was to educate and inform the public concerning the level of food safety at food service establishments. It was also an incentive for

restaurant owners and operators to improve and/or maintain a high level of food safety much like the Scores on the Doors scheme. Beginning 1 January 2008, it will be mandatory that restaurants in Iowa post their most current food inspection in a location readily visible to the public.

During the international session, three Environmental Health Officers gave presentations from Kenya, Uganda and Zambia. The presenters were in the UK as the result of Professional Fellowships awarded by the Commonwealth Scholarships Commission. Many areas of concern were discussed by the speakers such as the growing population, few resources for preventative health, poor communications, and the shortage of environmental professionals to cover the large distances. In two regions of Kenya there are 35 million people, 4,000 doctors and 20,000 nurses. I also was given the opportunity to speak about our environmental duties in Iowa. This session was very enlightening and inspires us to participate and promote the role of environmental health in developing countries. An International Special Interest Group (ISIG) of the CIEH is looking for people interested in environmental health to work and learn in Europe, America and in developing countries.

David Clapham, Principal Environmental Health Manager, Bradford, England, presented a briefing session on private water supply regulations for 2008. These regulations will introduce a change in the way private water supplies are dealt with by rural authorities. The overview of this session was upcoming changes in supply classifications, risk identification, monitoring for more chemicals and reporting. Risk assessment rather than compliance testing is designed to improve the quality of the water supplies. They have over 1,000 private water supplies that are tested by request of the homeowner.

"Way down yonder in New Orleans," was presented by Dr. Jerome Goddard on dealing with emergencies. Dr. Goddard is a highly entertaining presenter; he travels and speaks internationally about various aspects of insect pests and human health. Dr. Goddard, State Medical Entomologist, Mississippi Department of Health is a key member of the team that was sent in to sort out the aftermath of Katrina. A team of environmentalists treated potential breeding sites and handed out thousands of cans of insect repellent. When the salt marsh mosquitoes started hatching, you get 400 to 500 mosquitoes a minute. He estimated that during the clean up his team tested 40,000 mosquito samples for disease agents and found nothing. The reason diseases failed to break out is that the species that harbor the viruses were destroyed. I was touched by the compassion from fellow colleagues during and after this session.

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On Monday evening, 15 October, all delegates were invited to attend a fine medieval knees-up social event. As Robin Hood is said to have lived in Sherwood Forest, which extended from the north of Nottingham to the north side of Doncaster, Yorkshire, the social evening was centered on that theme. The evening included great food, drink and dancing. This event took place at the idyllic setting of Colwick Hall, Nottingham's magnificent Georgian country house mansion and once the home of Lord Byron. (As many of you have inquired, and I am sorry to report, I did not encounter Robin Hood in Sherwood Forest.)

Cheers to Denise Donnelly, CIEH Events Manager and the committee for their hard work and dedication to environmental health. The new "Best of the Best" Conference was indeed the best. I felt very much at home as the conference was designed similar to the ones we attend at the Iowa Environmental Health Association Conference (IEHA) and the annual National Environmental Health Association Conference (NEHA). A variety of 60 plus sessions were scheduled so practitioners could choose which session to attend. The sessions included information on environmental protection, health and safety, housing, food, and public health. The exhibition hall was full with 40 exhibitors displaying the latest developments and techniques. With more than 350 delegates in attendance this approach allowed the perfect networking opportunities and contacts to be made. Refreshment breaks and lunch could be taken when it suited you best during designated times. I enjoyed attending the conference, the sessions were very well presented, the information was invaluable, and the networking with fellow colleagues and exhibitors was enlightening. I must confess to Ann, I did sample every variety of biscuit during break time and at lunch. The biscuits, cheesecakes and pastries were "awesome."

Upon conclusion of the conference on 16 October, I travelled with my next host, Rosemary Lee to her home in Manchester, England. The city has an estimated population of 441,200. Manchester is well known for its sporting connections with two Premier League football teams. Manchester was known as the dominant international centre of textile manufacture and cotton spinning.

Rose is a Chartered Environmental Health Practitioner employed with the Wigan Council. She is the Smoke-free Wigan Coordinator and has spent many hours on the implementation of the smoke-free legislation. Her office is housed in Wigan, a town in Greater Manchester, England. The estimated town population is 81,203. Wigan business connections to

the town include: Heinz, JJB Sports and Uncle Joe's Mint Balls Factory. Wigan is famous for having one of the highest concentrations of Pubs and Social Clubs in the UK and is home to the annual World Pie Eating Championship, usually held at Harry's Bar. Although I missed the pie-eating contest at Harry's Bar, Rose and Ray treated me to fish and chips and a side of mushy peas. The cod fish was heavily battered and at least 12 inches in length and the chips were "french fries." I am not sure about the peas, except I like Iowa peas best. On Saturday night I was treated at Rose's pet restaurant, the Spicy Hut Restaurant and TakeAway to several dishes of Indian cuisine.

Major changes in health legislation occurred this past year and one of the biggest was the ban on smoking. On 1 July 2007, public places and work places went smoke-free in England. Wigan Council receives many complaints concerning where people can and cannot smoke. Outside a bingo hall, people were smoking at the front door, another call claimed the owners were smoking inside their establishment and another complained that patrons were smoking in a semi-enclosed area at a bar's front entrance. The legal definition of what type of shelter for smokers was permissible outside bars and restaurants states that no one can smoke inside any building or in any area that is more than 50% enclosed. The law was designed to prevent high concentration of hazardous air and reduce the second-hand smoke to others. Cigarette ends are found on over 80% of the UK's streets and are regarded as England's largest environmental litter problem. They believe that the only way levels of street litter can be changed is by encouraging behavioral change. By enforcing the ban on where persons can and cannot smoke it is hoped that many people will stop smoking or reduce the amount they do smoke.

On Wednesday, 17 October, I attended and spoke at the trainer's forum in Preston. This forum was presented by CIEH trainers and attended by 50 practitioners, most of whom were trainers in food safety. We shared information about food safety and how our inspections and training are different. Jon Flatman, a trainer for CIEH announced we would be using the concept of "speed-dating" at the end of the day's session. Of course he had everyone's attention, including mine. Every five minutes persons moved from one circle to another. This was a very unique way of meeting other professionals, networking, sharing information and concerns with several persons.

Safer Food, Better Business (SFBB) is a Hazard Analysis Critical Control Point (HACCP) scheme developed to provide guidance and support. Devised

by their government Food Standards Agency (FSA), SFBB is designed to help catering businesses such as restaurants, cafés and takeaways in their food safety management procedures. The food safety management pack is a simple, practical approach, developed to be pictorial and jargon-free and it is based on the 4C's: cooking, chilling, cleaning and cross-contamination. The pack includes information on personal hygiene, temperatures, cleaning procedures, food safety, managerial control, hazard identification. A simple diary for record keeping is included to chart daily and weekly progress. The UK government has spent millions on developing this very simple system for HACCP in small food businesses and caterers. Since the launch of the new regulations introduced in 2006, more than two-thirds of local authorities in England have received funding from FSA and by March of 2008 it is estimated that more than 50,000 small businesses will have received instruction and support on SFBB.

In England an Environmental Health Practitioner (EHP) is required to achieve a four-year degree, including a year's placement, similar to an internship in Iowa. An EHP would then be able to follow a specialist pathway if they so choose. Students study knowledge and skills, then acquire and develop knowledge in all aspects of environmental health to include food safety, health and safety, environmental protection, housing and public health issues. In addition they learn to protect and enhance public health. A practitioner is taught to understand the business, assess the risks, ask what is reasonable to control and ask if they have a plan in place for food safety. In Iowa, we are required to attend classes and workshops offered by the Department of Inspections and Appeals (DIA) and by the Food and Drug Administration (FDA). We learn our skills from our colleagues, who are the best resource. Most importantly, our work requires good people skills, good public relations, networking and the respect of the public we serve. With 400 local authorities in England, there is a national shortage of qualified EHPs just as in the United States. In both nations the shortage can be contributed to marketing strategies, heavy workloads, low salaries and lack of public awareness as to the definition of environmental health.

It was very interesting to participate in the food inspections with Wigan Council. Unlike Iowa, food establishments are not licensed in England; the owners of the restaurants just have to be registered with the local council (health department). Lynn Fish, an Environmental Officer with Wigan Council, and I inspected an outside caterer, as I would refer to in Iowa as a small "mom and pop operation" and a primary (elementary) school. The practitioners' two

main concerns are under-cooked foods and cross-contamination. Several of the health risks we looked at were the same; however, we did have different opinions on cross-contamination, food protection, personal hygiene and sanitation. In England, like Iowa, a separate hand sink is required; however, in England there are no hot and cold mixing water faucets at the hand sinks. The staff are allowed to dry their hands on a common towel. The dishes and utensils are washed with hot water and detergent, rinsed and then air-dried or towel dried. It is believed that if the dishes have been washed, rinsed and dried then the dish is safe from bacteria. In Iowa, a sanitizer is required after the rinse and all dishes are air-dried. Refrigeration of some products does not seem to be a concern, possibly because the temperatures in England do not get that hot. Eggs are not required to be refrigerated and some products, such as butter, are not refrigerated because of lack of space.

In England, the practitioner take notes in their "Pace Notebooks" during the inspection, asks the owner/operator lots of good questions, offers advice and helpful suggestions. However, no report is left with the operator. A standard letter is then typed and posted to the facility at a later date. The Pace Notebook is designed for practitioners to keep detailed notes to prevent court proceeding being jeopardised. The notebook helps ensure all enforcement officers follow the Police and Criminal Evidence Act, avoiding the risk of losing court cases due to errors in legal procedures. The Notebook is small and fits easily into a jacket pocket. In our department, we do the inspections on site with the computer, print the report, do an exit interview and leave a copy of the inspection report at the facility. Being computerized has saved us lots of staff time and repetition of the report.

On Sunday, 21 October, David Newsum very graciously offered to drive me to Ludlow for the final week of my exchange. I was not sure if I wanted my luggage in the boot or the bonnet, so we placed it on the back seat. That seemed safe enough. The trip was an excellent opportunity to talk about food inspections, training, policies and enforcement. As it was Sunday, we couldn't pass up the traditional Sunday dinner. We stopped at the Baron of Beef, a country pub in Bucknell, Shropshire and were served a very delicious four-course meal. The roast of the day was beef, served with roast potatoes, market vegetables and the famous Yorkshire pudding, a puffed pastry with gravy. As they would say in England, this was a brilliant choice.

Ludlow, a historical town in Shropshire, England, situated close to the border with Wales in The Welsh

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Marches has an estimated population of 10,000. Ludlow was built under the protection of the castle over 900 years ago and the grid pattern of the streets still remains a feature of the centre of modern Ludlow. The remains of a fine town wall encircle it. The Broadgate is the only remaining gate in the town walls. As the town was built on a hill, you either walk uphill or downhill to your destination. After a week working in Ludlow, I was undecided if I preferred walking down or up to work each day.

Chris Moss and Sue Allen were my hosts in Ludlow. Chris and Sue are Pollution and Sampling Officers with South Shropshire Council in Ludlow. The Environment and Community Services Division of South Shropshire Council, with a staff of approximately 24 are responsible for a variety of duties. The licensing team license alcohol, taxis, street trading, lotteries and animal welfare. The commercial team handles food safety, health and safety and infectious diseases. The pollution control team regulates mineshafts, contaminated land and private water supplies. The housing team is responsible for housing conditions, assistance and homelessness. Waste Services, better known as "The Street Scene team," manage abandoned vehicles, litter and dog control, client side street cleansing, food waste collection and pest control.

On Monday, we collected the "cool box" and headed out to take water tests. The husband of the household had been feeling poorly and wanted to make sure the water was safe to drink. Their water was gravity fed from a spring several miles away. We made our way across the pasture, with the sheep, to observe the 500-gallon reservoir (picture at right). Chris and Sue seemed impressed that the reservoir had a tight lid and I was stoned (in shock) at what I was seeing. The next stop was to test the water because of the surface run off during the severe flooding early this year. This well, or "bore hole" as they referred to it was a 3 foot circle, 50 foot deep, with a static water level at 6 foot. It was considered dry built as it was made out of brick. The owner had added concrete block to raise the opening above ground level and dug trenches at the bottom of the hills to prevent any future run off. The submersible pump, attached with a rope had fallen into the sediment at the bottom of the well, so we were unable to get a proper water test. With almost 50% of the tests failing in Ludlow with E Coli or bacteria present, homeowners are advised to boil the water or chlorinate the water before drinking. Most homeowners like the taste of the spring water and are unwilling to treat the water. The next day we took water samples at the nearby water plant. Finally during this water test, Chris and I could agree this "well" was what I refer to as a "well" in Iowa.

The septic system requirements, installation and maintenance are very similar to ours in Iowa. Their system consists of sub-surface perforated pipes, laid in shallow trenches partially filled with shingle (gravel). In Iowa this drainage field design is called a leach field and in England they use the term soakaways. If site conditions are unsuitable an alternative disposal method such as a biological treatment plant, cesspool or constructed wetland (reed bed) is used. If a cesspool is used it has to be emptied once a month.

In England a nuisance is defined as a health concern from an odour, dust, smoke, light or accumulation. A nuisance might also be a noise that causes disturbance to someone. Noise as a nuisance is a form of pollution and people haven't been aware that it can have an impact on their health. Anyone at any time can be affected by noise. Noise and nuisance complaints are called into the Ludlow office daily and they range from a disturbing noise to a tenant, a bright light shining into a homeowner's bedroom, an unpleasant smell or odor, smoke from a fire, or the barking of an unattended dog.

Fly-tipping, the illegal dumping of waste in an unauthorized area continues to be a problem in Ludlow and has risen by 5% with more than two million incidents reported around England. Local councils were told to follow examples of authorities that were reducing fly-tipping. The government is developing legislation that will give local authorities and the Environment Agency the power to stop, search and instantly seize vehicles being used to commit fly-tipping offences. All reports from the councils are filed and then sent to Fly Capture for documentation.

Rats continue to create problems in Ludlow as well as across England. To try to control the problem, the council pays £40 per private household for a pest company to apply treatment three times a year. The council pays approximately £1200 to £1400 out monthly to pest companies. This program is supported by local taxes. Water companies also do sewer baiting to control the problem. Contributing to the rat problems are the mild winters, the backyard feeding of birds, and waste management. A recent survey showed that rat numbers are increasing by about 20% each year.

The licensing team handles animal welfare issues such as licensing of the wolves, horse racing and circus acts. One of the most dangerous it would seem to me, is the licensing of the wolves. What started out as a hobby to Tony Haighway has evolved into a self-funding, not-for-profit organisation called Wolf Watch UK. The primary

function of Wolf Watch UK is as a rescue centre for displaced wolves. Volunteers who have dedicated their free time and skills to develop this project for the past ten years run the organisation. Time did not permit us to check on the licensing and welfare of the wolves. As one must go inside the enclosure with the wolves, this might have been beyond my call of duty.

A tour was arranged at the Ludlow Food Centre, Shropshire's largest purpose-built food emporium. The hall is 4,000 square feet and has eight glass fronted food production units. This facility is new to the area and has an excellent HACCP program in place concerning food safety. They grow and produce their own farm produce and organic specialty foods. They make their own jams and cheeses, pasteurize their milk and have a butcher's shop. George and staff provided an excellent tour, food samples and offered to send me a traditional pigs head with an apple in its mouth for my table centrepiece this holiday season. Whatever tradition this is, I do not observe that in Iowa; however, Sue's tradition of hanging chocolate pence (coins) on my Christmas tree this year sounds like a brilliant idea, at least the coins will be edible.

The second tour took us to South Shropshire BioWaste Digester Plant, operated by Greenfinch Limited. Kitchen waste and other food waste are being collected from households and businesses and delivered to the plant. The core process of the anaerobic digester is to process and recycle biomass into biofertiliser and compost. Biodegradable waste is separated into a solid fraction and a liquid fraction. The waste passes through the shredder into a conditioning tank on to the buffer tank and then passes to the pasteurisation tank and finally to the storage tank. Liquid digestate is used as a biofertiliser and the solid digestate is used for agriculture soil conditioner or compost for gardens. Another example of use would be a dairy farmer constructing this unit and the digestate state could be used for electricity, heating, liquid fertilizer or bedding. For additional information please check out their web site at www.greenfinch.co.uk.

The outdoor markets, shops and pubs in Ludlow were very charming and could be described as unique. The markets are held on Monday, Wednesday, Friday and Saturday. They sell wonderful fresh fruit and vegetables, baked goods, beautiful flowers and miscellaneous wares. At the local butcher shops you can purchase most any kind of meat to include dressed pigeon and various organs of animals. Outside the local butcher shops hang pheasants and rabbits, feathers and furs, insides and all. I was told they have to hang a while to taste

better before you dress them out. This of course would be a matter of opinion. At the pubs, it is acceptable to bring your dog inside the premise and tie them up while you indulge in a beverage or food. The pubs are quite accommodating; they even provide dog dishes for food and water. As I was just an "international customer" without a dog, what could I say? Only guide dogs or patrol dogs are allowed inside a facility in Iowa. Shops are open from 9:00 am or half past 9, until 5:00 pm or half past 5 during the week and business hours are restricted on Sunday to only 6 hours of operation set by choice of the facility.

As this was my first international trip, to say it was an experience of a lifetime would be an understatement and I have to include a couple of personal highlights. I spent many hours researching and note taking and thought I was very well prepared for my trip. However, the research does not prepare you for everything. I never realized that all 7.7 million people in London run to the train stations at 5:00 pm. I have never had to pay 20 pence or 20 cents to use the loo (toilet) at a train station; in fact I had never been in a train station or ridden on a train prior to this experience. I spent 20 minutes looking for a garbage can at the train station and found out you just place your garbage on the floor. Because of the threat of bombs, there are no garbage cans inside the station. Food was another highlight. I decided to try the "Full English Breakfast" which consists of fried everything: eggs, tomatoes, mushrooms, streaky bacon, sausage, bread and black pudding. Black pudding is made with pork fat, pig's blood, cereal, oatmeal and barley. (I could not bring myself to try that). Beans are a favorite in England, what I would consider pork and beans in Iowa. I have never seen so many beans eaten on everything or anything. (I personally do not care for beans for breakfast). The sabbatical exchange was a unique experience, both professionally and personally and I would recommend for all environmental health professionals to have the opportunity to participate.

Conclusion

In conclusion, as public health professionals, we must all work together towards the safety of our public and our environment. Where we choose to live and work does not matter because our mission statements all contain the same message:

Cerro Gordo County Department of Public Health—dedicated to enhancing the health status of our communities through public health initiatives.

Iowa Environmental Health Association—to promote education, influence policy and provide resources to environmental health professionals in

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order to protect the environment and promote public health.

National Environmental Health Association—to advance the environmental health and protection professional for the purpose of providing a healthful environment for all.

Chartered Institute of Environmental Health—to maintain, enhance and promote improvements in environmental and public health through knowledge, understanding and campaigning.

Canadian Institute of Public Health Inspectors—to advance the profession, science and field of environmental public health through certification, advocacy, education and setting standards.

Our goal is to protect and improve environmental conditions which influence the health and safety of every citizen. As the world around us changes, we must stay prepared. So often it takes a major disaster such as Hurricane Katrina, the terrorist attack of September 11, 2001, a food borne illness outbreak, or the threat of a pandemic outbreak to remind us of the reality that we must be prepared for the worst. Most often we are thought of as the “regulator;” however in reality, we are so much more. An Environmental Health Specialist or Practitioner is an educator, consultant and public relation expert. We must join the world in the fight to ensure our food and the environment remains a safe place to live and work for our children, their children and ourselves. We must seek the opportunity to build lasting international relationships, recognize new opportunities and plan for the future.

Acknowledgments

I would like to acknowledge and thank several individuals who assisted and supported me in this endeavour. This was truly a once in a lifetime, unique opportunity in the environmental field to study internationally. I would like to extend a very special thank you to Ann Goodwin who served as my contact/host with the CIEH. She spent many hours making contacts for my visit to the UK, setting up a very detailed agenda and was a very gracious host. Thank you to Rosemary Lee and staff with Wigan Council and to Chris Moss, Sue Allen and staff at South Shropshire District Council, in Ludlow for two very rewarding adventures. I would like to thank David Newsum for presenting the workshop and the transportation to Ludlow.

To my new international colleagues and friends I say thank you for the experience and memories to last a lifetime. Great friends are hard to find, difficult to leave and impossible to forget. We are truly two nations divided by a common language.

I would also like to acknowledge my family, who encouraged and supported me in this endeavour. To my colleagues at the Cerro Gordo County Department of Public Health, my supervisor, Brian Hanft, the director, Ron Osterholm and the Board of Health for the support and encouragement to fulfil this sabbatical exchange. Thank you to the co-sponsors, National Environmental Health Association (NEHA), Chartered Institute of Environmental Health (CIEH), Canadian Institute of Public Health Inspectors (CIPHI) and Underwriters Laboratories (UL) for their financial support.

SCOTLAND MAPS ENVIRONMENTAL NOISE

by **Martin Valenti**, Scottish Environment Protection Agency, project manager for the environmental noise directive for Scotland

The Environmental Noise Directive 2002/49/EC

The European Community Environmental Noise Directive requires member states to produce and publish strategic noise maps of all transport sources (road, rail and air) over a certain volume and agglomerations above a certain size. Member states are then required to use the maps to develop Action Plans by July 2008. This process is to be repeated every five years.

The noise directive contains four main elements:

- The harmonisation of noise indicators and assessment methods for environmental noise.
- The collection of information about noise exposure in the form of noise maps.
- The preparation of action plans.
- Informing and consulting residents.

The goal of this directive is to establish a common European approach, which - based on a prioritised foundation - aims to avoid, prevent or limit the effects, including annoyance, caused by exposure to environmental noise. Only large cities, roads, railways, and airports are covered by the directive.

In the first phase, noise maps have to be drawn up for urban areas with over 250,000 inhabitants, all major roads carrying more than 6 million vehicles a year, major railways with over 60,000 rail passengers a year, and finally, the major airports. In the second phase, urban areas with over 100,000 inhabitants, all major roads carrying more than 3 million vehicles, and railways with over 30,000 rail passengers a year will also be covered.

The noise maps will be drawn up using identical methods in all the EU countries, and information about noise will be made available to the public. Then, finally, action plans have to be adopted which aim to prevent and reduce environmental noise when this can lead to harmful effects on human health.

Considerations for Scotland

Scotland has two major agglomerations, Glasgow and Edinburgh (see maps below) which had to be

mapped by June 2007 then Aberdeen, Dundee and Falkirk (including Grangemouth) being mapped 5 years later in 2012. The maps displaying them are on the inside back cover.

Timescale for maps

The first noise maps for Scotland were completed on time for the June 2007 directive deadline and the first action plans are on target for completion by July 2008. The next round of maps and action plans has to be completed five years later, i.e. in 2012 and 2013. Member States had to appoint appropriate authorities or bodies to be responsible for implementing the directive, including the authorities who will draw up the noise maps and action plans.

For Scotland the Scottish Government are responsible for the production of noise maps and the preparation of action plans. The action plans will contain a complete description of the measures the relevant authorities intend to take to reduce noise pollution. A number of formal minimum requirements have been specified for the action plans, but there are no deadlines for when the various initiatives in these plans have to be implemented.

Dr Bernadette McKell partner of Hamilton and McGregor Acoustics Consultants leads a consortium who won the contract to develop and produce the noise maps. This involved sourcing, cleaning and collating huge amounts of transport data, which were then processed to produce individual transport source maps, and amalgamated maps of the two qualifying urban agglomerations. This was the largest data collection exercise carried out for noise work in Scotland.

Managing action plans

To manage the Scottish noise action plans a core steering group was established to oversee the action planning process. The Scottish Environmental Noise Steering Group (SENSG) comprises representation from all parties involved in environmental noise. The group comprises representatives from the Scottish Government, local authorities, the Scottish Environment Protection Agency (SEPA), British Airport Authority (BAA), Transport Scotland and Network Rail. The primary aim of SENSG is to provide a forum for all key partners to review the development and progress of Action Plans and to determine the prioritisation of control measures.

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SENSG will act as the core group to oversee the consistent development and implementation of all Action Plans. SENSG has established three working groups to assist in the preparation of Action Plans and these groups will feedback to the core group. There is a Glasgow agglomeration working group, an Edinburgh agglomeration working group and a Transportation Action Planning working group. All three groups have representation on the core steering group.

Airport operators have a key role to play in Action Planning and will be able to input to all working groups. The airport operators will also be represented on the Transportation working group. The Scottish Government's nominated noise mapping consultants, Hamilton McGregor, assisted in the development of noise maps for the four major airports in Scotland. Noise data was prepared by the Civil Aviation Authority (CAA) and Bikerdyke Allan, Noise Consultants. This data was then transferred to Hamilton McGregor who assisted the airport operators in the preparation of their respective maps. The airport operators are as follows:

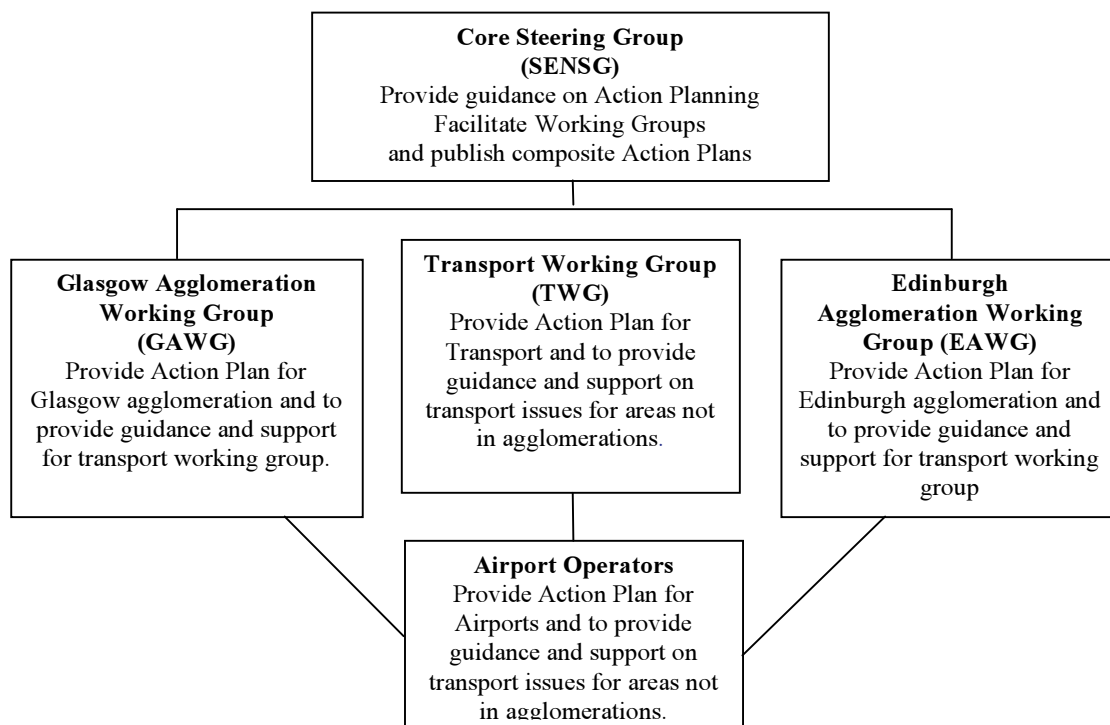
British Airports Authority (BAA) who operate and represent Glasgow, Edinburgh and Aberdeen airports, and Glasgow Prestwick Airport which is a privately run operation

Stakeholder cooperation

The following list shows the organisations and key partners who were involved in round one Action Planning:

The Scottish Environment Protection Agency (SEPA)
Glasgow City Council
City of Edinburgh Council
East Dunbartonshire Council
East Renfrewshire Council
North Lanarkshire Council
Renfrewshire Council
South Lanarkshire Council
West Dunbartonshire Council
East Lothian Council
Midlothian Council
Local Authorities not in agglomerations for local road issues
Regional Transport Partnerships
BAA Glasgow, Edinburgh and Aberdeen
Glasgow Prestwick Airport
Transport Scotland
Network Rail
Royal Environmental Health Institute of Scotland

Structure of steering and working groups



Action plans will be developed as follows:

1. Analysis of the strategic noise maps. This should include population exposure information that requires to be sent to the commission in December 2007. This will allow identification of candidate areas for noise management areas.

2. Further investigation and analysis of the candidate areas that could include noise measurements but will involve checks on the ground to ensure that the assumptions underlying the strategic maps are reflected at the local level. (For example the strategic maps may show high exposure levels but there may have been physical changes on the ground since the data was collected). More simply there may also be some inaccuracies in the maps as they are strategic maps after all.

3. A review of existing UK, Scottish and Local policies, plans and programmes that may have an impact on the strategic environmental noise climate for the areas identified as potential noise management areas. (e.g. transport plans and programmes, local plans, air quality management plans).

4. An evaluation of potential mitigation measures to manage noise, with options subject to a cost benefit analysis. This could include identifying gaps in existing policies and plans with recommendations to fill those gaps as appropriate.

Content of action plans

The action plans have to be reviewed and modified if necessary whenever significant changes take place which affect the existing noise situation, or at least every five years, following their completion.

Action plans will include:

- description of area taken into account, authority responsible, legal context
- limit values in place (acc. to Article 5) + summary of noise mapping results
- evaluation of estimated number of people exposed to noise
- identification of problems and situations that need to be improved
- noise-reduction measures already in force and any projects in preparation,
- actions which the competent authorities intend to take in the next five years

- measures to preserve quiet areas and long-term strategy,

Determining Quiet Areas

The Directive requires action plans for agglomerations to include measures which aim to protect quiet areas against an increase in noise. The regulations require that Quiet Areas within agglomerations are identified. The Transport Research Laboratories (TRL) undertook research for Defra on the subject of Quiet Areas and this can be viewed on Defra's website at www.defra.gov.uk.

The research reported that defining, identifying and appreciating the benefits of preserving Quiet or relatively Quiet Areas in urban conurbations cuts across many different fields including health, physical and psycho-acoustics and environmental psychology. An important aspect of the research carried out into Quiet Areas has been to establish the positive effect natural sounds have on health and well-being.

Action planning prioritisation matrix

To ensure that a fair and consistent approach is adopted when determining an action plan, it was important to develop a prioritisation methodology that allowed for some flexibility and local circumstances. The matrix itself must be straightforward, transparent, consistent, yet robust enough to withstand scrutiny. The matrix should be used only after the initial desk studies have been carried out.

The purpose of the matrix is to establish what areas require interventions, and in what order etc. The matrix would therefore be based on existing pollutant linkage models, for example; Source – Pathway – Receptor scenarios.

Considerations for the matrix includes:

- Noise bands from strategic maps (Source)
- Distance from source(s) (Pathway)
- Population density/exposure (Receptor)
- Local circumstances, location history – number of complaints, site sensitivity etc,
- Likelihood of success of mitigation based on a Cost Benefit Analysis (CBA).

When considering interventions it is important to remember that wherever practicable, interventions must be based on existing programmes or initiatives and must aim to align with current expenditure. Interventions should be presented as a ranked list based on the findings of a CBA.

Examples of the Scottish noise maps can be found on the inside back cover.

Views from Scotland's Environment Minister

Scotland's Environment Minister, Mr Michael Russell, recently said "There are no instant solutions to the problems of noise pollution. This is a long term process. But the publication of these maps is the starting point of an exciting journey and will inform work to be done in the future. We are next required to determine the number of people impacted by excessive noise and then in conjunction with relevant local authorities develop and produce Action Plans for these areas by July 2008.

"We don't yet know the extent of the task but rest assured this work is designed to make Scotland a better - and quieter - place. I look forward to working with relevant stakeholders in Scotland to help achieve that task."

Martin Valenti from the Scottish Environment Protection Agency (SEPA) is the project manager for the noise mapping project and has been seconded to the Scottish Government to lead on the noise directive. He said: "It is vital that the public appreciate the noise maps are just the first stage in the process to manage environmental noise in Scotland. The real challenges lie ahead in preparing action plans to address noise, where it is deemed a problem. This work will be carried out by the designated working groups.

"Scotland were first to produce both strategic noise maps and action planning guidance and are leading the rest of the UK in developing noise action plans."

Health effects of environmental noise

A study on the effects on health from excessive environmental noise was carried out by the World Health Organisation (WHO) Noise Environmental Burden on Disease working group. The findings were first presented at the Internoise conference in August 2007 in Istanbul.

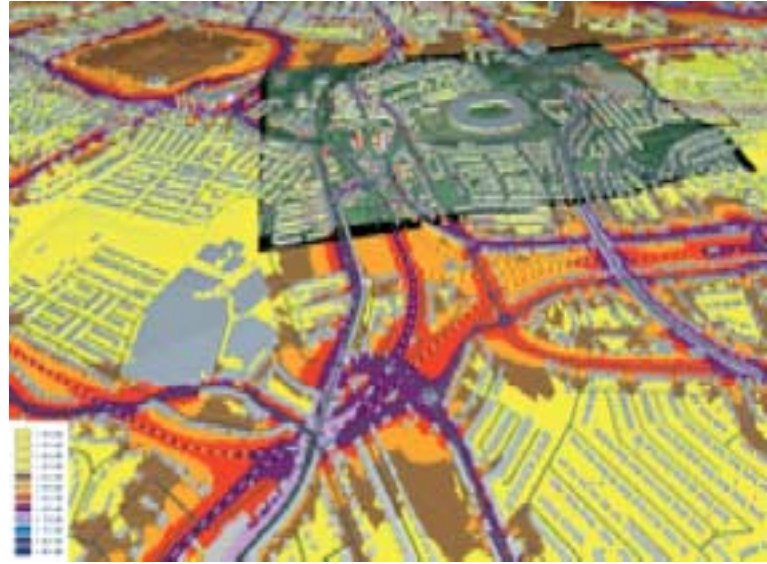
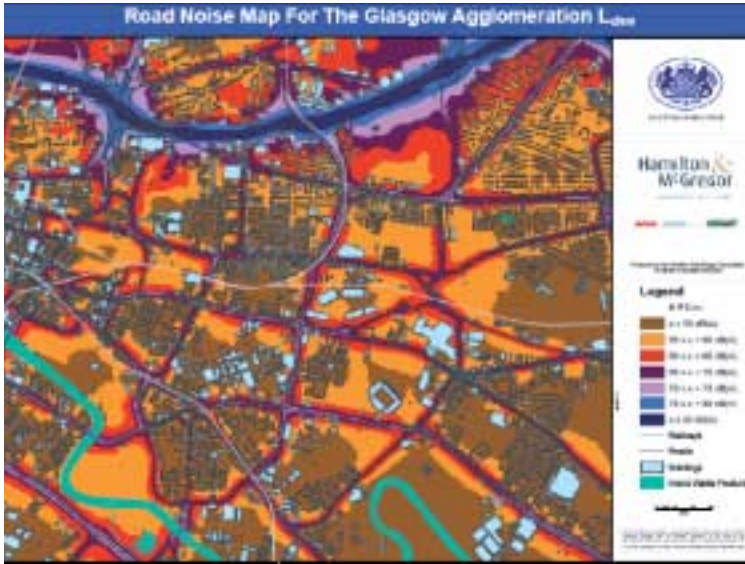
The working group reported that about 2% of Europeans suffer severely disturbed sleep, and 15% suffer severe annoyance due to environmental noise. According to the working group, long-term exposure to environmental noise may account for approximately 3% of coronary heart disease (CHD) deaths (or about 210,000 deaths) in Europe each year. To obtain these estimates, the working group compared households with abnormally high noise exposure with those with quieter homes. They also reviewed epidemiological data on heart disease and hypertension, and then integrated these data into maps showing European cities with different levels of environmental noise.

The study reported that more than 15 million Americans currently have some form of coronary heart disease (CHD), which involves a narrowing of the small blood vessels that supply blood and oxygen to the heart.

Conclusion

It is widely anticipated that the production of strategic noise maps across the EU will raise the awareness of the forgotten pollutant as it is often deemed. The development of strategic noise maps will ensure greater emphasis on the management and control of environmental noise and will for the first time, provide a general focus for politicians and policy makers alike to tackle the harmful effects of environmental noise.

EXAMPLE OF THE SCOTTISH NOISE MAPS – FLAT AND 3D IMAGES



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EDINBURGH AGGLOMERATION



GLASGOW AGGLOMERATION





Members of the Malta Association of Public Health Inspectors visit the Royal Environmental Health Institute of Scotland in Edinburgh.



Delegates to the IFEH Council meeting were met on arrival by Port Health colleagues and members of the Association of Public Health Inspectors, Kenya.



Delegates who attended the IFEH Council meeting in Nairobi.