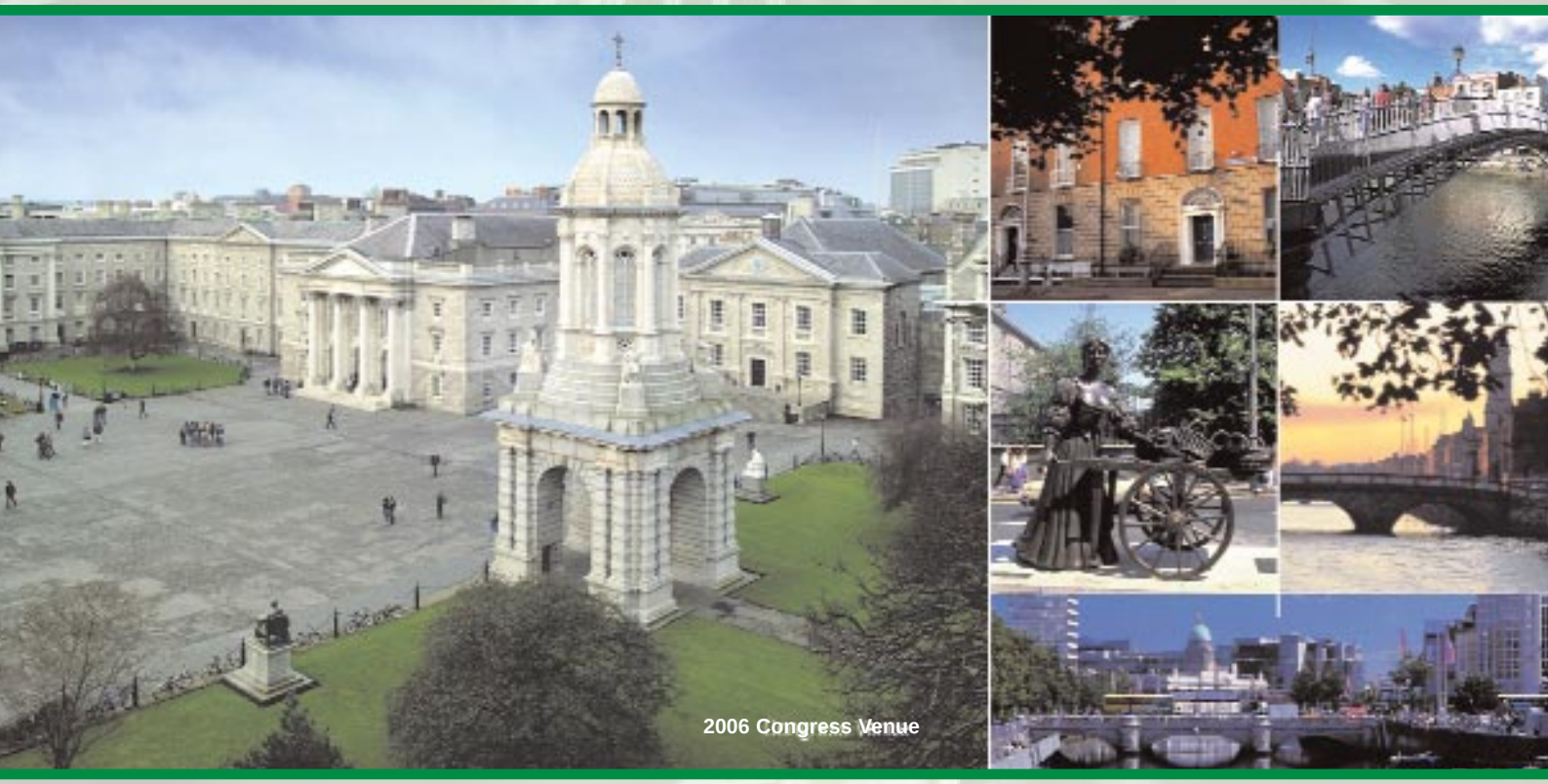
E&HI Volume 7 No. 1 2005

ISSN 1726-9210

Environment and Health International

Magazine of the International Federation of Environmental Health



2006 Congress Venue

Cover Photograph:
Collage of scenes around Dublin, Ireland, venue for the 2006 Congress

IFEH REGISTERED OFFICE
Chadwick Court
15 Hatfields, London, UK SE1 8DJ

www.ifeh.org

CONTENTS

Many thanks to all contributors to this issue of Environment and Health International

Deadline for submission of articles for the next issue is

1st September 2005

Contact John Stirling

11 Muirwood Drive

Currie

Edinburgh EH14 5EZ

SCOTLAND

e-mail: j.stirling@btinternet.com

PRESIDENT'S COMMENTS

Jerry Chaka

The last IFEH council meeting was held on 11-12 September 2004 in Denver, Colorado, USA. My thanks and appreciation goes to the National Environmental Health Association (NEHA) for hosting the meeting. Their hospitality is appreciated.

A number of key decisions were taken at this meeting that will see the IFEH a step ahead. It was however, disappointing to discover that only nine out of the thirty-six full members of IFEH attended. This is despite the decision taken in the year 2000 of reducing IFEH Council meetings to one Council meeting per annum, this being an attempt to cut down costs for member organizations on attendance of meetings. It is important to note that decisions taken at Council meetings are binding on all member organizations and it is therefore imperative that the majority of our member organizations show up for popular decisions to be taken. I therefore make an appeal to all members to attend these meetings. The concern is about council meetings that are held in between world congresses as against council meetings held during world congresses.

The Royal Environmental Health Institute of Scotland (REHIS) pledged an annual donation of GB£ 3 000,00 per annum to the IFEH. The donation will run for the next five years and it really comes at the time when financial support is needed most. This pledge by REHIS is the second financial support by REHIS to IFEH. My sincere appreciation of this generous donation goes to the Council of REHIS.

The need for the establishment of an administrative office for the IFEH remains a major challenge for us. Member organizations that are in a position to assist in setting up such an office are requested to come to the fore. I am convinced that our success in setting up an administrative office will ensure that our administration will be run in a more professional manner that will befit this organization.

The IFEH has set aside funds for the development of the IFEH and member organizations in the quest for environmental development. Regulation 6 of 2004 set out criteria for the awarding of funds. Members are advised to adhere to the closing dates reflected in the notice issued by the Hon. Secretary, as no applications will be considered after the closing date. We hope to see achievement of new findings and sharing of expertise in the development of environmental health with projects sponsored through the development fund.

When we had our rest during the festive season in December, thinking that all is well around us, South Asia was befallen by a disaster. The Tsunami disaster is a real challenge to us as Environmental Health professionals and it will remain a challenge to us for some years to come as we deal with the aftermaths of this disaster. We are expected to give service to areas of housing, sanitation, safe water supply, ensure safe disposal of unknown/ unclaimed bodies, accumulation of refuse/debris, contain the outbreak of infectious diseases, etc. I applaud those colleagues within the IFEH who shared their expertise unselfishly to assist in this disaster. Those that contributed in money and kind to relief organizations are also applauded. A statement was released and is available on our website on the Tsunami disaster. We also donated GB£1,000.00 to the International Federation of Red Cross & Red Crescent Societies towards the relief of the disaster. My sincere condolences to all those that lost their loved ones around the world due this disaster.

Wishing you all a successful year

IFEH President, presents the first of the new membership certificates to Colm Smyth, EHOA of Ireland

Tobacco Control – The Irish Experience

By Marie McCaffrey, Environmental Health Officer, South Western Area Health Board, Dublin

'It's a shocking thing, blowing smoke out of our mouths into other peoples' mouths, eyes and noses and having the same thing done to us.' Dr. Johnson, 1709-1784.

Few people now dispute that tobacco use is damaging human health on a global scale. It is an accepted principle of public health that humans should not knowingly be exposed to recognised carcinogens in circumstances where such exposure is effectively preventable[1]. Currently, over 500,000 deaths per year in the European Community are attributed to smoking, with more than 7,000 of those taking place in Ireland.

Research has shown a decrease in the number of people smoking in Ireland from 31% in 1998 to 27% in 2002. Recent studies also show a further decline to 25%.[2]

The health hazards caused by exposure to Environmental Tobacco Smoke (ETS) are now well established and universally accepted. Ironically, the people exposing non-smokers to the risks of ETS are primarily work-mates, friends, spouses and family members.

The US Environmental Protection Agency in 1992 defined 'ETS as being comprised of exhaled mainstream smoke from the smoker, side-stream smoke emitted from the smouldering tobacco between puffs, contaminants emitted into the air during the puff, and contaminants that diffuse through the cigarette paper and mouth end between puffs'[3].

Outline of the Progression of Tobacco Control in Ireland

Prohibitions and restrictions on the consumption of tobacco products have been well established in Irish society for years now. There have been significant developments in Irish legislation in recent years to improve the scope and effectiveness of tobacco control initiatives.

The first major legislation to be introduced was the *Tobacco Products (Control of Advertising, Sponsorship and Sales Promotion) Act 1978.* Under this the *Tobacco Products (Control of Advertising, Sponsorship and Sales Promotion) Regulations, 1991* were enacted, addressing issues such as:

- Tobacco companies to inform the minister of sponsorship and advertising expenditure,
- Advertising prohibited in publications aimed at persons under 18 years, but permitted only internally at retail premises, duty-free areas, on packages of tobacco products and in trade publications, Content of adverts outlined and criteria for sponsored events,
- Requirements for display of health warning and tar and nicotine yields.

Tobacco Products (Control of Advertising, Sponsorship and Sales Promotion) (Amendment) Regulations 1996 and The Tobacco Products (Control of Advertising, Sponsorship and Sales Promotion) (Amendment) Regulations, 2000 & (Amendment) (No.2) Regulations, 2000 introduced additional prohibitions to:

- Prevent the use of adverts as a promotional device,
- Prohibit the sale of tobacco products at promotional prices. Retailers not permitted to sell tobacco products lower than 97% of the set price.
- Prohibit advertising in any literature, however exemptions did exist such as subscriber literature and trade journals, foreign literature if it was unavailable without the advertisement if it was not specifically printed for the Irish market. It also depended on the number of copies available nationally.

The *Tobacco (Health Promotion and Protection) Act, 1988* was a very significant piece of legislation. It allowed the Minister of Health to introduce Regulations to prohibit or restrict the consumption of tobacco products. It also made it:

- Illegal to sell tobacco products to under 16's,
- Illegal to sell tobacco in packs of less than 10,
- Prohibited use of certain constituents in tobacco products and prohibited oral smokeless tobacco products.
- Fines for smoking in 'no-smoking' areas included:
- 127 euros for person found smoking in 'no-smoking' area and
- 635 euros for owner/operator/manager of same area.

Many policy documents have emanated from the Department of Health and Children in the past few years in relation to tobacco control, many of which have not been referred to here. More information on them can be viewed at www.doh.ie.

In 1994, a published report called 'Shaping a Healthier Future' identified smoking as a key area that needed to be addressed to facilitate a reduction in morbidity and mortality from tobacco related diseases. A target was set to reduce the percentage of smokers by at least one percent annually so that by the year 2000, 80% of the population aged 15 years and over would be non-smokers[4].

As a follow on from the 1988 Act, the *Tobacco (Health Promotion and Protection) Regulations, 1995* prohibited the consumption of tobacco products in certain premises for example bingo halls, cinemas/theatres, public service vehicles, doctors/dentists waiting rooms, hair dressers, food prep areas, public buildings, to mention but a few. It also restricted smoking to 50% of the seating area of restaurants. This was the main piece of legislation used by EHO's when enforcing smoking restrictions, prior to the introduction of the Smoke-Free Workplace Legislation.

In 1999, a report called 'A National Anti-Smoking Strategy- A Report on Health and Smoking' stated that a national anti-tobacco strategy should be adopted and concluded that the state initiate legal action against tobacco companies for the damage to health that their products have caused.[5] Following on from this, the Department of Health and Children established a task force called the Tobacco Free Policy Review Group. 'Towards A Tobacco Free Society' was a government report published in 2000 by this group. It looked at the issues of addiction, health effects, the tobacco industry and their marketing strategies, and smoking prevalence among all ages. The report called for tougher regulation of the tobacco industry.[6] Six key locations were identified where people are compelled to be and in which they need to be given priority protection against tobacco smoke, including enclosed workplaces. The Government directed that the necessary legislation be prepared to give effect to the report.

In 2001, a Sub Committee on Health and Smoking was established to re-address the issues raised in their 1999 report. Interestingly, the tobacco industry has declined to appear voluntarily before the Sub-Committee who are now considering what action they will take.

The Environmental Health Officers' Association (EHOA) launched a policy document in 2001 in which one of the recommendations was the adoption of stricter regulations in relation to tobacco in public places.[7] In the same year, the *Health (Miscellaneous Provisions) Act, 2001* came into effect making it an offence to sell tobacco products to persons under the age of 18 years. The selling of tobacco products extended to the use of vending machines and the fine for an illegal sale was increased to 2540 euros.

Under the *Public Health (Tobacco) Act, 2002*, the Office of Tobacco Control was founded and charged with co-ordinating the national inspection programme for tobacco control. In conjunction with the Health Boards, the Office of Tobacco Control developed a set of tobacco protocols and associated records. These protocols are based on best practice and provide guidance to EHO's, as well as ensuring consistent enforcement of tobacco legislation on a national basis.

The EC (Manufacture, Presentation and Sale of Tobacco Products) Regulations, 2003, which came into effect this year cover three main areas:

Labelling: Health warnings to cover 30% of the front surface of the tobacco packet and 40% of the back.

Cigarette yields: New reduced maximum yields of tar, nicotine and carbon monoxide in cigarettes

Product descriptions: Prohibit the use of misleading terms such as 'light', 'low-tar' and 'mild'.

Why Did Ireland Introduce Smoke-Free Workplaces?

An independent scientific report commissioned by the Office of Tobacco Control and the Health and Safety Authority, "The Health Effects of Environmental Tobacco Smoke (ETS) in the Workplace, 2003", concluded that exposure to ETS causes lung cancer, heart disease and respiratory problems. The report particularly notes that bar staff and other hospitality workers are a unique risk group in that their workplaces constitute extreme ETS exposure settings. Subsequently, a prohibition on smoking in enclosed workplaces, including licensed premises, was introduced under Section 47 of the Public Health (Tobacco) Acts, 2002 and 2004.[8] This legislation is enforced by Environmental Health Officers under Section 48 of the Acts.

Based on available studies, Irish pub workers appear to have significantly higher ETS exposure than their counterparts in England, the US, Quebec, Hong Kong and New Zealand. This is primarily because Irish bar-staff work longer hours. In 2002, James Repace, says that up to 150 Irish bar workers will die in that year due to ill health caused by the effects of second-hand smoke.[9] The findings are based on a measurement of cotinine levels among bar workers in Galway, extrapolated to take account of the 26,000 full-time bar staff in the Republic.

(Source: EHOA Conference, 17th May, 2004, The Grand Hotel, Malahide, Ireland)

Lothesome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs and in the sinking fume thereof nearest resembling the horrific Stigian smoke of the pit that is bottomless'
- King James 1, in a decree banning tobacco from his kingdom, 1604

Introduction of a Smoking Prohibition

The initial public announcement was made on the 30th January 2003, which allowed for a long lead-in period before the commencement date of 29th March 2004. It provided ample opportunity to sectors to prepare and adapt. The media coverage and extensive public debate generated showed how important this issue had become.

In preparation for the implementation of the ban, the Dept of Health and Children organised a comprehensive information awareness campaign entitled 'Smoke-Free at Work'. It comprised leaflets, booklets and posters for employers, promotional materials for the hospitality industry, information for the general public, a radio and television information campaign and the launch of a website covering all aspects of the legislation.

The hospitality sector had expressed particular concerns about the difficulties in introducing smoke-free bars. In response, the Office of Tobacco Control implemented a national advertising campaign and in conjunction with the relevant representative bodies agreed to develop specific workplace guidelines for the hospitality industry to facilitate compliance with the ban.

Smoking outside a café

A Smoke-Free Compliance Line was set up to report contraventions and to provide advice.

In relation to compliance in pubs and bars, research conducted for the Office of Tobacco Control in late January of this year showed that 73% of the public who visited pubs in the previous two weeks were non-smokers, whereas 27% were smokers, so only in the region of one quarter of pub customers are smokers. Further research conducted late last year showed that 81% of the public stated that publicans should comply with the law, including 61% of non-smokers.[10]

Support for the smoking ban was welcomed from the Irish Hotels Federation and the Restaurants Association of Ireland. Very close to the implementation date of the ban, the vintners' organisations made an announcement encouraging their members to comply with the law.

The Legislation

The 'Smoke-Free at Work' initiative was introduced under the *Public Health (Tobacco) Act, 2002 (Section 47*). The smoking ban is primarily a health and safety measure to protect workers and members of the public, who are exposed to the harmful effects of environmental tobacco smoke in the workplace. Both Environmental Health Officers and Officers of the Health and Safety Authority (HSA) enforce this legislation. A Memo of Understanding, outlining lines of demarcation, has been agreed between the HSA and the OTC to which the Department of Health and Children is also a party.

Section 47 (1) of the *Public Health (Tobacco) Acts 2002 and 2004* prohibits smoking of a tobacco product in a specified place, in so far as it is a place of work, for examples: public service vehicles, health premises, school/college, public buildings, cinema/theatre, licensed premises and registered clubs, to mention a few.
Section 47(2) specifies that a person found smoking in a specified place, in so far as it is a place of work, is guilty of an offence.
Section 47(3) specified that the occupier, manager or any other person for the time being in charge of the place where a contravention occurs, shall be guilty of an offence.

Section 47(4) establishes a defence of 'all reasonable effort' for managers or persons in charge of a place where a contravention has occurred.[11]

The following are the recommended minimum reasonable efforts required as per the guidelines published:

- To develop and implement a smoke-free policy, a draft of which is given in the guidelines
- To display the required 'no-smoking' signs, which are also contained in the guidelines pack
- To remove all ashtrays and other like receptacles and provide external stubbing bins, where appropriate
- To inform a person smoking in a bar/restaurant/night-club/other place of work that they are committing an offence
- Refuse service to individuals who are smoking in violation of the law and request any person smoking in the premises to extinguish the smoking material or leave

Section 47(7) lists exempted premises, some of which are: prisons, garda station detention areas, nursing homes, psychiatric hospitals, guesthouse/ hotel bedrooms, 3rd level campus bedrooms, etc. An exemption only confers the right not to be penalised for non-enforcement of the legislation. An employer does not have to accept the exemption and a duty-of-care still exists. Employers of exempted premises are advised to review their policies with a view to eliminating exposure where possible but at least to minimise exposure to ETS. Any smoking in exempted premises or places should be located such that smoke from these areas cannot enter the enclosed workplace and should ensure that employee exposure is minimised.

Section 46 of the Acts refers to the display of signs and the information to be detailed on such. It is required that they be permanently displayed in a conspicuous position, normally at each entrance, service counter, toilet facility and staff room. All signs must detail the name of the occupier or person in charge and the name of the person to whom complaints should be made.

Finally, section 5(2A) states a 3,000 euros maximum fine for anyone who breaks the law, be it the smoker or the operator of the premises, or both.

It is at management discretion whether they wish to provide outdoor smoking facilities or not. However, if such is provided, it is subject to legislative requirements. An outdoor area, suitable for the purposes of smoking is defined as:

- A place or premises, or part of a place or premises that is wholly uncovered by any roof, fixed or mobile
- An outdoor place or premises, covered by a roof, as long as not more than 50% of the perimeter is covered by a wall, windows, gate (or similar)

If you can ban smoking in Ireland then the Tobacco Industry knows it can be banned anywhere!'

Prof. Stan Glantz

Smoking outside the workplace

Enforcement

EHO's and Health and Safety Authority Inspectors undertake enforcement. A Memo of Understanding has been agreed between the Department of Health and Children, the Health and Safety Authority and the Office of Tobacco Control, outlining lines of demarcation. The EHOA also had representatives on this committee.

The two agencies act in a co-ordinated capacity. The traditional workplace locations visited by the Health and Safety Authority are still under their enforcement.

EHOs enforce the legislation in the food and hospitality sector, the health sector and in categories inspected by EHO's under previous tobacco legislation.
Members of the public who observe contraventions of the law are advised to first raise the issue with the proprietor of the premises concerned. If they do not receive a satisfactory response they are then advised to contact the compliance line. Such complaints are then passed onto the appropriate enforcement agency and investigated.

Progress to Date

The Office of Tobacco Control published a progress report in May, compiling data from the first month of the smoking ban. The report focuses on the licensed trade, as this is where most of the public interest lies. Most other categories of workplaces have been subject to tobacco control legislation for a number of years now. Hence, compliance levels are extremely high and they did not receive as much public interest and debate. The report comprises data from the smoke-free workplace compliance line, the national tobacco control inspection programme, market research on public attitudes and behaviours.

In the first five weeks of the smoking ban, the compliance line received 1,524 calls. Complaints accounted for 677 of the calls, with over half of these being received in the first week. As can be seen from Table 1, there has been a steady decline in call volumes since then. More than 2/3 of the complaints received related to the hospitality sector.[8]

Many thanks to all contributors to this issue of Environment and Health International

Deadline for submission of articles for the next issue is

1st September 2005

Contact John Stirling

11 Muirwood Drive

Currie

Edinburgh EH14 5EZ

SCOTLAND

e-mail: j.stirling@btinternet.com

Table 1: Activity on Smoke- Free Compliance Line (Source: OTC Progress Report, 2004)

Business Type	Complaints	Inspections	Section 47- % Compliance (Smoking)	Section 46- % Compliance (Signage)
Hotel	30	414	95%	91%
Restaurant	7	1231	99%	90%
Licensed Premises	592	4993	96%	89%
Other	114	949	97%	69%
Total	743	7589	97%	87%

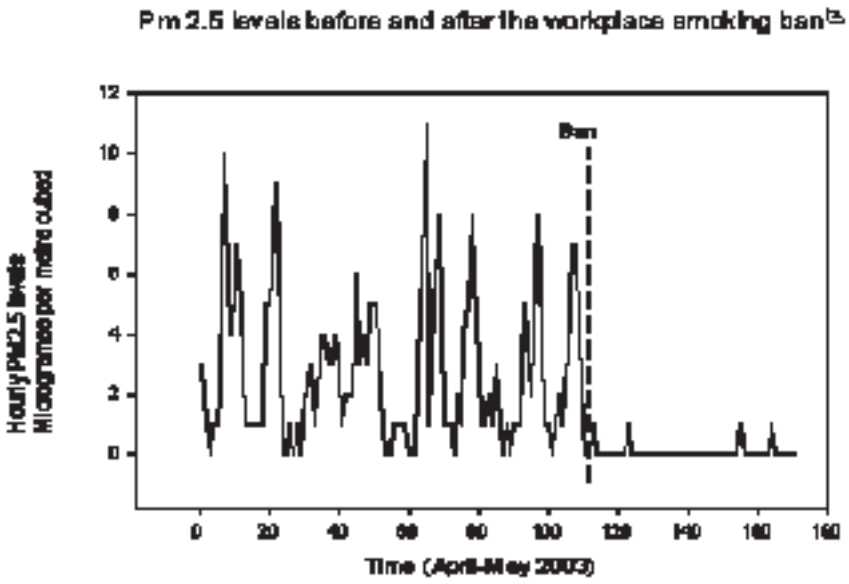
At the time of the publishing of this report, compliance levels in relation to licensed premises were high nationally with 97% of premises inspected being compliant in respect of the smoking ban and 87% compliant with the requirements for 'No-Smoking' signs. (See Table 2). Non-conformances have generally involved the design of smoking shelters or people smoking in the toilets. Guidelines are currently being drawn up by the Attorney General in relation to the design and specification of smoking shelters.

The Office of Tobacco Control conducted research on public attitudes and behaviour one month prior to the ban and one month after the introduction of the ban. A representative sample of 1,000 people were involved, aged 15 years and older. The research indicates that compliance with the law is very high and that visiting patterns to pubs and restaurants remain constant.

Since the introduction of the smoking ban, 71% of the population surveyed stated that they had visited a pub within the previous fortnight, as opposed to 68% before the ban. The rate of pub visiting by smokers had remained steady at 74%. Visiting patterns to restaurants has remained constant since the introduction of the ban, with 91% of the population stating that they would be

Table 2: National Compliance Data (Source: OTC Progress Report, 2004)

Call Type	Week 1	Week 2	Week 3	Week 4	Week 5	Total
Complaint	284	167	66	104	56	677
Information Request	9	2	4	4	1	20
Query	305	61	40	30	28	464
Prank	229	57	49	19	19	464
Total Calls	827	287	159	157	101	1521



more likely or just as likely to visit a restaurant to eat. Since the introduction of the law, this figure is 92%.[12]

Dublin City Council Smoke-Free Workplace Study

Dublin City Council decided to introduce a workplace-smoking ban in May, 2003, quite a few months before the national ban came into effect. It was a prime opportunity to conduct a pilot study to determine the effectiveness of the smoking ban. The methodology focused on short duration area measurements of particulate mass (PM) levels, which is the term given to the tiny particles of solid or semi-solid material found in the atmosphere. PM may be divided into many size fractions, measured in microns. From a human health perspective, particle sizes from 0.1 to 10 microns are examined as particles smaller than this are generally exhaled. Above 15 microns most particles are too large to be inhaled.

Air particle measurements were made over 3 days before and 3 days after the ban came into effect. Measurements of PM 2.5 were made using an Aerocet 531 particulate mass counter with data logger. The device, which is hand held, sucked air into a sampling chamber and then measured the concentrations of particles using light scatter technology. Readings were recorded every two minutes and averaged over the hour.

Dublin cafe

Results

As can be seen in Diagram 1 above, clearly, the measured PM 2.5 levels are generally quite low. However, the monitoring shows a dramatic reduction in PM 2.5 levels co-incident with the introduction of the workplace-smoking ban, as can be seen in the graph.

The only factor, which changed over the monitoring period, was the banning of smoking. All other sources of airborne particulates remained unchanged, for example cooking. The conclusions of the study show that the smoking ban was highly effective at reducing the exposure of staff to indoor airborne particulate levels. Currently we are conducting a similar study in public houses in Dublin city to measure the effectiveness of the legislation in relation to reducing exposure to ETS. It is hoped that we will see a similar dramatic drop in particulates following the nationwide ban on smoking in the workplace.[13] A smoke-free workplace both

protects the non-smoker from the health dangers of passive smoking and also provides a supportive environment to smokers who wish to quit the habit. There can be no dispute about the health benefits of the 'Smoke-Free at Work' initiative.

References

Daynard R., 2003; *Why Tobacco Litigation.* Tobacco Control 2003; **12;** 1-2
Slán Health and Lifestyle Survey, Health Promotion Department of NUI, Galway.
Environmental Protection Agency (1992). *Respiratory health effects of passive smoking: Lung cancers and other disorders.* United States Environmental Protection Agency. Office of Research and Development, Washington D.C., USA.
Shaping a Healthier Future, (1994) Department of Health and Children, Hawkins House, Dublin
Houses of the Oireachtas. Joint Committee on Health and Children. A national Anti-Smoking Strategy-A Report on Health and Smoking. Leinster House, Dublin 1999
Department of Health and Children, (2000) Towards a Tobacco Free Society- Report of the Tobacco Free Policy Review Group, Hawkins House, Dublin
E.H.O.A. (1995). Ventilation in Public Houses. Environmental Health Officers Yearbook. A policy document from the Environmental Health Officers Association. Tara Publishing Ltd. Poolbeg Street, Dublin 2
Office of Tobacco Control, (2004). *Smoke-Free Workplace Legislation Implementation, Progress Report,* Kildare
Repace, J. and Mulcahy, M. (2002) Seminar on *Hazards of Environmental Tobacco Smoke - Identifying and Protecting Those at Risk*, Office of Tobacco Control (OTC), Dublin Castle, Ireland
Office of Tobacco Control Press Release, March 2004
Office of Tobacco Control, (2004). *Guidance for the Irish Licensed Trade- Public Health (Tobacco) Acts 2002 and 2004, Section 47- Smoking Prohibitions*
Office of Tobacco Control, Press Release, 11th August, 2004
Clancy L, Fitzpatrick MJ , Goodman P, McCaffrey M and McCartan AM, (2004) *The Ban on Smoking in Pubs and Restaurants in Ireland.* American Thoracic Society 98th International Conference Conference, Orando, USA,

International Certified Standards for Hygiene in the Food Manufacturing and Allied Industries by *Donald MacDonald*

Introduction

There was a time not so many years ago when the hygiene standards in a food factory were dictated by the official food control officials using the appropriate food legislation for their country. In the past 20 years or so that has largely changed.

That is not to say that official food control has lost its importance – it is obviously of fundamental importance for the public to feel that there is an official body looking after their interests – but in most of the major, reputable food manufacturing businesses the standard of hygiene has taken a quantum leap above that required by law or the enforcers of that law.

What has enforced this change? There are perhaps several answers to this question but fundamentally it is a customer driven change with the customers being the various national and international supermarket chains. In effect the supermarket chain (the customer) tells the manufacturer (the supplier) what standard of hygiene they expect the factory to achieve if they wish to be or continue to be a supplier.

Background

For several decades major supermarket chains have had their own standards which they applied to their suppliers. These tended to cover quality as well as issues such as hygiene, labelling, food composition etc. The 1980's and 1990's saw the introduction in law in many countries of the concept of 'due diligence' which in simple terms means that the only defence in law for a food company that is alleged to have broken the law is that they took all reasonable steps and precautions to ensure that they didn't break the law. The supermarkets, quite understandably, decided that part of their defence was to control the standards of the food which they accepted for sale in their outlets. In short they had to control the standards in the food factories which supplied them.

The Growth of Supermarket Standards

For a long time each supermarket had their own standard. This had quite a number of disadvantages including:

- Cost to the supermarket chain in that they all employed their own auditors and hygiene teams and all had the maintenance costs of keeping their standard both up to date and relevant.
- Cost to the food manufacturers in that, if they supplied more than one supermarket chain, then they had more than one audit for which to set aside time and they had more than one standard which they needed to comply.
- Confusion for the consumer in that they had no benchmark with which to judge the standards for each supermarket – Mr and Mrs Joe Public had no criteria or experience to form an opinion on, for example, whether the standards set by Marks and Spencer were better, worse or the same as those set by Tescos.
- Differences in the standard of auditing.

There were of course many good points about the system:

- The standards which had to be achieved were significantly above the 'minimum' standards set down by legislation.
- The standards were considerably more detailed and wide ranging than the standards set down by law.
- Compliance with the standards was judged by 'auditing' techniques rather than by 'inspection' techniques (see below) therefore consistency of approach by the auditors of a standard was much easier to achieve in that the only judgement to be made was conformity/non-conformity with each clause of the standard.
- Provided the standards were well written and well focussed the general level of hygiene in food manufacturers inevitably rose well above the minimum standard required by law.

'Auditing' v. 'Inspection'

It is perhaps worth mentioning the difference between these two allied but different approaches.

Most definitions of the word audit as it applies to food businesses are variations on a theme along the following lines:

*'An **audit** is a systematic and independent examination to determine whether activities and results comply with documented procedures and whether or not these procedures are both implemented properly and are suitable to achieve the stated objectives.'*

A simpler definition is supplied by Dillon and Griffith, 1997:
'are you doing what you say you do and is it appropriate'

Inspection, on the other hand, almost always includes an element of sampling, measurement, examination, testing, analysis and interpretation. In many circumstances it is also taken to mean inspection of the product rather than the process.

Some clue to the difference between the two words comes from their Latin origin. Inspection derives from the Latin *'inspect-'* – meaning looked into, examined. Auditing comes from the word *'audire'* – to hear – through to the Medieval Latin *'auditus compoti'* which literally means 'audit of an account' as these original audits were presented orally. Inspection, therefore, originally meant 'looking in to' and auditing meant 'listening to'.

The problems of Supermarket Standards

As mentioned above, these original supermarket standards, although they were responsible for significant changes in general hygiene standards, had a number of inherent problems.

Imagine for a moment that you are a food manufacturer supplying your product to four different supermarket chains. Each of these customers wants to audit you a minimum of twice per year for two days at a time. Each audit requires a minimum of one day's preparation and probably two days for dealing with the audit report. That means you have to pay a senior member of your staff, usually the quality manager, 40 working days per year, plus the time of other staff members, just for customer audits!

In addition, although there were many similarities between the different standards, there were also

significant differences. There are many anecdotal tales of, for example, maintenance engineers running around a factory on a Monday changing the positions of Electronic Fly Killers because the following day an auditor was due from Supermarket A and then the following Monday changing them to yet another position because an auditor from Supermarket B was due and whose ideas on the positioning of these pieces of kit were different!

Clearly many food manufacturers were unhappy with having to satisfy the seemingly inexplicable differing needs of several customers and rightly complained that surely food safety was food safety whether the auditor came from Marks and Spencer's, Tesco's, Safeway's or the Man in the Moon!

This, together with the possible cost benefits, led many supermarkets to consider the benefits of 3rd party auditing.

3rd Party Auditing

A 1st party audit is an internal audit by the supplier compared to a 2nd party audit which is carried out by a customer on its supplier.

A 3rd party audit is one where an independent company, with no interest in either the supplier or the customer, carries out an audit to an agreed standard. This audit is paid for by the supplier. It has the advantage of cost effectiveness, independence and consistency. This is usually a certification audit. When the standard is a Nationally/Internationally accredited standard both the certifying company and the auditor have to meet the rigorous conditions laid down by the National Accreditation Service.

International Standards
There are a number of internationally recognised standards. In the USA there are, for example, the standards of the National Sanitation Foundation (NSF) in addition to those of the American Institute of Bakers (AIB). Although these are principally active in the USA they are to be found throughout the World especially where American companies are operating.

Europe has two main standards which are recognised outside their country of origin. The first of these, historically, is the global food standard of the British Retail Consortium (BRC), an organisation which includes many of the major supermarket chains in the UK. This standard is to be found in any country which has manufacturers which supply, among others, the British retail market. They also have global standards for food packaging. Initiated in Germany, the International Food Standard (IFS) is to be found mainly in Germany and France although they do try to market it more widely.

There are some real benefits to these standards in that, for example, a company which is certified to the BRC global food standard will normally have a reduced number of supplier audits from supermarkets that are either members of the BRC or accept the BRC standard. In addition both the certifying companies and the auditors are the subject of strict controls by the national accreditation body (UKAS in the UK) and they are themselves audited. Some reasonable degree of competence, consistency of approach, experienced background and credibility is therefore achieved.

However, there are still some problems.

Problems with International Standards

The problems, in Europe, can be summarised as follows:

- There is more than one standard and although the standards are broadly similar in objectives (safe food) there are sufficient, and often hard to understand, differences in the detail which prove annoying and costly to a manufacturer who requires to be certified to each standard in order to satisfy all his customers.
- There is no mutual recognition clause
- The BRC standard was drafted by a broad mix of those who wanted the standard, those who were to be audited, those who would do the auditing, accreditation bodies and independent technical advisors whereas the IFS was drafted mainly by those who wanted the standard. Many suppliers and independent experts have questioned the value of these two widely differing approaches.
- The BRC standard has clauses with which a supplier either conforms or doesn't conform and the result of the audit depends on the number and type of non-conformances. The

IFS standard, which appeared on the scene some time after the BRC one, has a mixture of BRC type clauses and ISO 9001:2000 clauses allied to a rather complicated scoring system. These differing approaches make it difficult for a supplier to conform to both standards.

- The BRC has clearly decided that their food standard should only apply to food and have produced a separate standard for food packaging. On the other hand there are those who ask for and attempt to apply the IFS standard to food packaging even if it is quite clear from its content that it is only a food standard. For reasons which they keep to themselves, the IFS have until now declined to make any comment on whether or not their food standard is valid in the packaging industry. This is neither helpful nor economical to the packaging manufacturers who are being asked for different standards by different customers.
- Although one of the aims of these standards is to eliminate 2nd party audits, to date it has at best only slightly reduced them.
- It is often difficult with all of the standards to see the relationship between what a clause asks for and any measurable risk to public health from consumption of the food.

These are only a few of the irritations felt by the suppliers who were entitled to assume that the advent of recognised international standards would lessen the burden and problems of 2nd party audits.

HACCP Certification

Some companies are asked by their customers to have their HACCP system certified and there are a number of companies who supply such a service. However, this is very much a case of *caveat emptor* in that the manufacturers should enquire closely about what exactly is being certified, will their customers accept the certification and if their money is being well spent. General advice for any company who would wish to have their system, be it HACCP or full hygiene system, audited would be to check on the credibility of the scheme, the certifying company and the auditors and make an assessment of what they are actually paying for and its cost benefit and cost effectiveness.

The future

It is a true saying that the customer is king. It follows therefore that if some German and French supermarket chains want to have the IFS standards applied to their suppliers and British supermarket chains want the BRC standard then there is no argument; they are the customers and that is what they want. However, the net result is confused suppliers, increase in cost to the consumer and no measurable difference in the safety of the food produced by either applying one standard or the other. Both of these standards if properly applied will ensure a safe product which is produced to a level which is considerably higher than that required by law.

It is to be hoped that in the not too distant future the ‘owners’ of these two European standards can, for everyone’s benefit, sit down and agree to standardise their standards or at the very least agree to accept each other’s standards. But I say that more in hope than anticipation.

References

Dillon M. & Griffith C.“*How to Audit. Verifying Food Control Systems*”, M.D.Associates 1997
Engel D.‘*Hygiene Audit and HACCP Training for Food Packaging Manufacturers’*, Chadwick House Group Ltd., 2003.
Engel D.‘*Ratgeber zum Technical Standard for Companies Manufacturing and Supplying Food Packaging Materials for Retailer Branded Products BRC/IoP’* D. Engel 2003 (in German)
Engel D., MacDonald D. and Nash C.‘*Managing Food Safety’* Chadwick House Group Ltd., 2001
MacDonald D. and Engel D. “*Auditing Food Safety”* Chadwick House Group Ltd – 2001

Donald MacDonald, originally from Scotland, has lived in Germany for many years and works as an international food safety consultant, author and journalist. He can be contacted on +49 6305 993376 or by email dmacdonalddj@aol.com

The next meeting of the IFEH Council will be held in Vancouver, Canada on 8th & 9th October 2005

QUANTIFICATION OF DEPENDABLE WATER IN THE LOWER USUTHU BASIN FOR SUGARCANE IRRIGATION IN SWAZILAND -

by Joseph S. Mtshali, Dip.Phi (S.I.H.S), Dip.H.P.Ed. (Tanzania), B.Sc.(Hons) Env. Health (Strathclyde, Glasgow), M.Sc.WREM (U.Z Department of Environmental Health Sciences)

Abstract

After King Mswati III of Swaziland, promulgated the cultivation of sugarcane on Swazi nation land in 1992, the Water Apportionment Board started to experience an unprecedented influx of water right applications. The competition for water permits was so high that within five years the Apportionment Board declared that water from the Lower Usuthu was over committed with a total of 11,300 hectares (ha) of irrigated sugarcane and that no further allocation of water was possible.

This study was conducted to quantify Dependable water in the Lower Great Usuthu River Basin using data of the month that recorded the lowest flows (in 38yrs of records) from gauge station no.6 located in the Lower Usuthu Basin. The aim was to determine the amount of water committed in the basin and the balance of water which would be available for further allocation to aspiring sugarcane farmers.

The main conclusion reached was that there was 10.4 m^3/s of dependable water available for allocation in the Lower Usuthu as opposed to 9.1 m^3/s used by the Apportionment Board. Also concluded was that the water requirement for sugarcane in the Lower Usuthu was in accordance with the General Notice 13 of 1973, namely 0.87 l/s /ha during the month of September, when river flows are low. This means that water available is sufficient for 12,000 ha sugarcane, and that there is room for a slight increase of 700 ha of sugarcane compared to the current establishment of 11,300 ha.

It is recommended that a quantity of 10.4 m^3/s be accepted as dependable water in the Lower Usuthu Basin. Recommended also is that evaluation of available dependable water be done every year which will mainly involve monitoring of available water for use. Possibilities of storm water storage should be evaluated to increase the available water in the Lower Usuthu Basin.

Introduction

The Usuthu River originates in South Africa, enters Swaziland through the highveld and cuts across the country through the middleveld and flows to the lowveld and lubombo where it exits the country to Mozambique. The river has a length of 380 km, and its drainage basin covers an area of about 30,000 km^2 with a mean runoff of 3,705 Mm^3/annum measured at the mouth of the river at the sea (Draft agreement, 2000). The Great Usuthu River is mainly used for sugarcane irrigation in Swaziland in the lower parts of the basin (Funnel, 1985). Very little is used in the upper parts (Piesold, 1997). Swaziland being a member of Southern African Development Community (SADC) acknowledges and endeavours to honour her responsibility and obligations on the downstream member states and the environment (Piesold, 1997). This involves being responsible in water use, to consider that the downstream countries and the environment also need a share in the available water.

The catchment area of the basin

The catchment areas located in South Africa contribute some 59% of surface water; the area in Swaziland contributes 41% and Mozambique 0.1%. It should be realised that as much as Mozambique contributes very little water, this does not mean that Mozambique does not have a claim to the water generated from the watercourse (Gareth and Hamilton, 2000). This is evidenced by the treaties signed by the riparian countries (1983-1995) and supported by the SADC Protocol on shared watercourses (2000) where countries under SADC made an undertaking that riparian countries to a watercourse must cooperate in the development, use and conservation of water resources in the region.

There are five dams along the Usuthu Basin. Four of the dams are in South Africa with total capacity of $693x10^6$ m^3 and one in Swaziland called Luphohlo dam constructed in 1985. Luphohlo dam is located on the Little Usuthu River (a tributary of the Great Usuthu River) with

a volume of $24x10^6m^3$ (Carlbro, 1989). South Africa uses the dams for irrigation and the one in Swaziland is used for hydropower electricity generation only.

There have been several consultations between Swaziland and her neighbours on how the riparian watercourses can be shared, especially during water scarcity. In 1983 an agreement was signed whereby a normal flow was to be maintained in the riparian rivers of the Usuthu/Maputo and Ngwempisi River (Carlbro, 1989). This normal flow was described as the 20% low flow during July to October, which is the critical period for irrigation in the Lower Usuthu (Carlbro, 1989; Ministry of Agriculture, 2000). The following dam operations procedures in South Africa were adopted in order to maintain the minimum desirable low flows in the Usuthu River to sustain the downstream uses. Whenever the flow in the Usuthu River at the South Africa-Swaziland border drops to a discharge less than or equal to the desirable minimum low flow, 0.08 m^3/s will be released from the Westoe Dam into the Usuthu River. Above this requirement, the actual operation procedure was to be determined by experience and was to take account of travel time for the water released from the dam to reach the border of Swaziland. It was estimated that the total quantity of water required to maintain the desirable minimum river discharges downstream of the dams in the watercourses was 4,770 m^3 / day (Carlbro, 1989).

Irrigation developments of the riparian countries in the Usuthu / Maputo Basin

South Africa and Swaziland have large areas developed in terms of irrigation in the basin, while Mozambique has none (Draft Interim Water Allocation, 2000). This might seem to be an unfair water allocation on the part of Mozambique. It is known that Mozambique had irrigation development around the Maputo River (Professor Savenije, personal communication, 2000) but because of the civil war that engulfed Mozambique in the 1980s farming was abandoned in this part of Mozambique. There is no doubt therefore that in the absence of war, Mozambique will want to resume the irrigation, and have a share in the development of the basin. This will put more stress on the already vulnerable resource in the Great Usuthu.

Water shortage in the lower Usuthu Basin

In the face of increased unemployment and escalating cost of living in Swaziland, King Mswati III provided and made available to the Swazi nation several schemes of funds where communities can acquire loans and grants (without collateral) to start income generating activities either in groups or as individuals. This was started in 1992 when the King made it official to cultivate sugarcane on Swazi Nation Land (Swaziland Sugar Association, 1994 and 2000). This has assisted many Swazis to engage in sugarcane farming.

When the sugar industry launched its 1990 strategic plan, one of the strategic components was to encourage a direct participation of Swazis in the sugar industry, especially those on Swazi Nation Land who had for a long time been partially involved as labourers (Swaziland Sugar Association, 1994). In 1991 the Swaziland Sugar Association allocated a quota of 10 000 tonnes of sucrose to indigenous farmers who are on Swazi national land. By 1994 the number of people taking up the quota started to show exponential growth such that by 1999 the quota allocated to small-scale farmers was about 17 000 tonnes of sucrose which is equivalent to some 1,500 *ha* of sugarcane (Swaziland Sugar Associating, 2000). Sugarcane became an easy and attractive option for the Swazis on Swazi Nation Land because of the following reasons:

The Great Usuthu River passes through land suitable for sugarcane farming.

The land is close to the Sugar Mill Company where farmers can sell their produce with less transportation cost.

Skilled technicians from the sugar association are deployed to assist smallholder farmers (without charge) on farming techniques.

The expansion of sugarcane farming by communal farmers, while welcomed by the sugarcane company as a relief to its quest to expand its operations, created a problem of water competition between the established company fields and newcomers in sugarcane farming. For the past five years the Water Apportionment Board in Swaziland has not been allocating new water permits in the Usuthu River for irrigation to farmers. According to the Apportionment Board, no more “dependable” water is available for allocation. As a result, more than fifty prospective farmers are unable to get water

permits because of water shortage (Kenneth Msibi, personal communication, 2000).

To an ordinary Swazi farmer, having a quest for sugarcane farming and irrigation, the shortage of water in the basin is not real and is created by those who do not want to see an indigenous Swazi engaged in the "Swazi gold" (as sugarcane is sometimes called in Swaziland) production. The water shortage in the Lower Great Usuthu is bound to cause a conflict that might be difficult to control in the future if it remains unchecked. People may start to abstract water without water rights. This will not only cause problems for Swaziland but will also affect neighbouring Mozambique downstream.

Objectives

This study was designed to quantify the following:

- Water that could be depended on in the Lower Great Usuthu River Basin using monthly data that recorded the lowest flows (in 38yrs of records) from gauge station no.6 located in the Lower Usuthu Basin.
- The amount of water required for sugarcane irrigation;
- and the balance of water, which would be available for further allocation to aspiring sugarcane farmers.

Hypothesis

It was the belief of the researchers that there was enough water in the Lower Great Usuthu Basin to meet the demand of the sugarcane farmers (both large and small-scale). The reason that there appears to be a shortage of water was that, there was lack of recent figurers on the quantity of dependable water in the Lower Usuthu Basin. Reliance had been on an analysis done 27 years ago. This study intended to explore this hypothesis further with an aim of proving it right or wrong and come up with an acceptable figure for dependable water quantity in the Lower Usuthu.

Methodology

There are several gauge stations along the Usuthu River within Swaziland. Gauge station No. 6 was chosen for point of data collection and analysis due to its strategic position in relation to the point of water abstraction and sugarcane fields irrigated. The dependable flow was determined by analysing 38yr data obtained from this gauge station located at Siphofaneni.

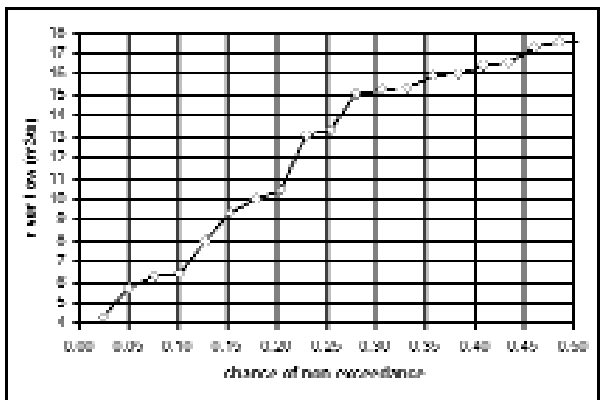
Using the data at gauge station no. 6, the month that recorded the lowest flows in 38 years of data collection was determined graphically (using a mean and median) and its records were used in the calculation of the dependable flow in the Lower Usuthu. The definition of dependable flow as defined by Carlbro (1989) and being used by the Swaziland Water Apportionment Board through General notice no.13, (1973) was used to define the chance of non-exceedance to ascertain the probability of water availability and risk involved in the water allocation. A plotting formula of a/(n+1) was used to calculate the chance of non-exceedance, where (a) represent the rank number and (n) the total statistics. Water allocated was calculated from hectares of land cultivated and irrigated. Knowing that per hectare, 0.87l/s of water is allocated total amount of water was computed.

Results and discussion

Quantification of dependable water from gauge station No.6

Dependable yield (DY) for a given gauge station is defined as the natural flow exceeded during 80% of the records at a gauging station on a river (Carlbro 1989). The dependable flow for gauge station No.6 was determined graphically (**Figure 1**) using a 38 years data series of the average monthly flow for September.

Figure 1: Chance of non-exceedance of river flow during the month of September, at Gauging Station 6; N=38 years



9th WORLD CONGRESS ON ENVIRONMENTAL HEALTH – Dublin 18th- 23rd June 2006

Kuala Lumpur, Brighton, Aberdeen, Oslo, Stockholm, Aberdeen, Sydney, San Diego and most recently Durban, South Africa, are the cities which to date have hosted the World Congress on Environmental Health. Next year Dublin will join that list when the Environmental Health Officers Association, as main organiser, brings the 9th World Congress to town.

Planning for this event began a long time ago. In 1999, following on the initiative of our past Chairmen Ian Daly and Gerry McDermott, the EHOA made a successful bid to host the Congress. The International Federation of Environmental Health (IFEH) now has member organisations in over thirty countries. As one of the four, albeit the smallest, founding members of IFEH back in 1986, winning the right to host the congress was an achievement to savour. Next year will mark the twentieth anniversary of our membership of IFEH and in a way a sort of coming of age for our Association when Colm Smyth takes over as the Federation's President. Under the changed rules of IFEH, Colm is the first person to be elected to the post, a personal honour for him but a tribute also to the EHOA for our contribution to the IFEH.

The Congress will take place in Dublin over a week in June 2006. This is a major event for us and will replace our regular annual conference. The Congress Centre of Trinity College Dublin is the venue. Trinity College is one of the oldest universities in Europe and the 35 acres campus is located right in the heart of the city. This 16th century campus, surrounded by attractive gardens is an ideal location for congresses.

Dublin, the capital of the Republic of Ireland is built on the river Liffey, is situated by the sea and has a population of approximately 1.5 million. A city of fine Georgian buildings, Dublin has been influenced by its Danish, Norman and English antecedents, but happily combines its proud past with its modern outlook.

With a mixture of key note speeches, plenary and parallel sessions, we expect that there will be over eighty presentations, as well as poster sessions. One day will be devoted to technical visits. A first announcement and formal call for papers issued in early 2005. At the same time a dedicated Congress website www.ifeh2006.org is now available and will provide continuing updates. In parallel with Congress, there will be a meeting of the International Faculty Forum, which is aimed at academic staff who are involved in the delivery of third level environmental health education programmes. The forum will be take place on Sunday 18th June 2006 in the Dublin Institute of Technology which is the national centre for professional environmental health education in Ireland.

Currently we have a Steering Group, chaired by former EHOA chairman Gerry McDermott, which is working on the planning of the event. There are four broad themes for the Congress

ENVIRONMENT AND HEALTH

- Air Pollution
- Built Environment
- Major Incidents – planning & recovery
- Noise control
- Housing
- Waste Management
- Water Quality

FOOD SAFETY

- Biotechnology
- Control strategies
- Microbiology
- Food Chemistry
- Nutrition
- Obesity

OCCUPATIONAL HEALTH

- Risk Management
- Safety Management
- Stress Management

PUBLIC HEALTH

- Health Promotion
- Migrant Workers
- Tobacco control
- Toxicology
- Vector Control

We are working to ensure major international participation both as delegates and as speakers. Our aim is to make it a stimulating, attractive and enjoyable event for all comers. IFEH through its member organisations represents over 40,000 professionals working in the fields of environment and health. We surely must and can learn from each other. Dublin in June 2006 will present a great opportunity.

Going on past experience, the standards set by previous organisers are getting higher and higher. In 2002 the congress in San Diego was an efficient, well organised event in a beautiful city. In Durban in 2004, the South African Institute of Environmental Health attracted the largest attendance to date with over 700 flocking to a magnificent purpose built conference centre. We may not offer the brand new facilities to match those in Durban, but we are intending to replicate past events. In Trinity College we have a historic and unique venue. The current President of IFEH, Jerry Chaka was in Dublin in January to see the facilities for himself and was most impressed.

Delegates can be assured of a unique event, in terms of the mix of papers, speakers and not forgetting the social side. There will be ample opportunities for the all important networking. So will it be all talk and no action? Hopefully not. The EHOA and its Steering Committee are mindful that EHOs are all practically minded people. We hope therefore to ensure some practical outcomes from the Congress, aimed at the improvements in environmental health.

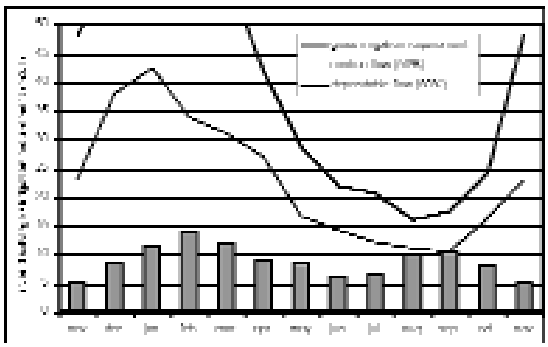
See you in Trinity.

Raymond Ellard
Congress Steering Committee
Environmental Health Officers Association
(Ireland)

The Board during a visit to Trinity College, Dublin, in January 2005 - Jerry Chaka, Mike Halls, Colm Smyth, Steve Cooper

Figure 2 demonstrates that the month of September is the month that records the lowest annual flows in the Lower Usuthu River at gauging station No.6.
The calculation of dependable yield at 20% risk was found to be 10.4 m^3/s (**Figure 1**), 14% higher than estimated in 1973. According to our calculation, a flow of 9.1 m^3/s will be exceeded in 85% of the years during the month of September. September was found to be the limiting month to both dependable flow and irrigable land (**figure 2**).

Figure 2: Water availability in Lower Usuthu and gross irrigation requirement of 11,990 ha of sugar cane



According to the regulation governing the water apportionment, there is 9.1 m^3/s of dependable water passing through gauging station No.6 (at 20% non exceedance) (*General Notice no.13, 1973*). The regulation also indicates that the Water Apportionment Board uses a general figure of 0.875 l/s *per hectare* of land to be cultivated regardless of the crop to be planted. In the lower Usuthu only sugarcane is allocated water for irrigation and other crops are expected to be rain-fed.

Records from the Sugar Association and Sugarcane Farming Extension Office show that companies cultivate and irrigate a total of 9,800 *ha* of land in the Lower Usuthu. This then means that they are allocated 8.6 m^3/s of water. Indigenous farmers in the same watercourse cultivate and irrigate 1,500 *ha* of land, which translates to a flow requirement of 1.3 m^3/s at gauging station No. 6. The total amount of water allocated is thus 9.9 m^3/s. This implies that there is an over allocation of 800 l/s from the Lower Usuthu River as per readings at gauge station No. 6, if the recommendation of the *General Notice No.13, (1973)* is considered. Also this means that there is no water for further allocation.

The researchers analysed September data series of 38 years (based on monthly stream flow) and determined the dependable yield of water passing through gauge station No.6. Dependable yield was found to be 10.4 m^3/s (F**igure 1 and Table 1**). The difference between the dependable yield as determined and defined by *General Notice No 13 of 1973* and the calculated figure by the researchers could be attributed to the difference in time scale between the two calculations. Within the 27 years interval of the calculation of dependable water yield a lot could have happened that could have a bearing to the change in flow i.e. rainfall pattern. Considering the extent of the data used by the researchers a conclusion can be made that the dependable yield at the gauging station No.6 is presently 10.4 m^3/s.

If it is agreed that there is 10.4 m^3/s of water available for allocation in the Lower Usuthu Basin and the criterion of 0.87 l/s is considered, then 12,000 *ha* of land can be irrigated, as opposed to the 11,300 *ha* currently irrigated. This shows that an additional 700 *ha* of sugarcane can be irrigated (**table 2**). Taking 20 *ha* per farm (recommended by Sugar Association as a minimum to realise profit), 35 indigenous farmers could still be accommodated with the amount of water available.

Table 2: Irrigable area in the Lower Usuthu Basin

Irrigation requirement	Dependable flow available	
	9.1 m^3 /s	10.4 m^3 /s
At 0.875 l/s/ha	10,400 ha	12,000 ha
Current establishment	11,300 ha	11,300 ha
Difference	-900 ha	+700 ha

Conclusion and recommendations

From the results and discussion it can be concluded that dependable water at the Lower Usuthu Basin for now is 10.4 m^3/s. It is recommended therefore that this figure for dependable yield of the Great Usuthu River in the Lower Usuthu Basin be accepted and used for water allocation to irrigating farmers in the basin. Recommended also is that evaluation of available dependable water be done every year which will mainly involve monitoring of available water for use. In addition a study should be conducted to ascertain possibilities of constructing a storage facility to store storm water at the basin to

supplement dependable yield of the Great Usuthu and increase the quantity of available water for irrigation.

Acknowledgement

Sincere gratitude to Dr Peter van der Zaag for his expert guidance, assistance and criticism throughout the study; Prof.J. I. Matondo for contributions towards the structure of the study; and the Ministry of Natural Resources and Energy for unreserved support in providing relevant information.

References

Carlbro, (1989) *Assessment of dependable yields of Mbuluzi, Ngwavuma, Usuthu Rivers and Tributaries*, Danish Hydraulic Institute. Ministry of Natural Resources, Swaziland.

Draft *Agreement Document, (2000). Interim water use allocations (South Africa, Swaziland and Mozambique)* unpublished paper. Ministry of Natural Resources, Swaziland.

Funnell, D. (1985), *Water resources and the political geography of development in southern Africa*: The case of Swaziland. University of Sussex, Washington.

Gareth P. G. Hamilton J. R., (2000) Water allocation, transfers and conservation: links between policy and hydrology. *Water Resources Development 16, no. 2.*

Ministry of Natural Resources (1973). *Swaziland General Notice No. 13 of 1973*, Water Apportionment, Lower Usuthu Control Area.

Knight, P. (1997). Water sector situation report. Ministry of Natural Resources, Mbabane, Swaziland.

Ministry of Agriculture and Cooperatives (2000). Feasibility study into development of smallholder irrigation in the Lower Usuthu River Basin. Mbabane, Swaziland.

SADC (2000). Guidelines for co-ordination and networking. Water sector co-ordination unit Maseru, Lesotho.

Swaziland Sugar Association (1994). Sugarcane farming in Swaziland; Small-scale growers. Swaziland Journal 4:14

Swaziland Sugar Association (2000). Swaziland Sugar Association fact sheet, Swaziland August No. 1

Swaziland Draft Water Policy, (2000). Unpublished paper. Ministry of Natural Resources, Swaziland.

Water and Environment Journal of the Chartered Institutions of *Water and Environment Management (20000). Volume 14 No. 10 -15).*

Environmental Health News, the weekly magazine of the Chartered Institute of Environment Health has announced a new quarterly supplement, EHN International.

Set to launch early in 2005, the news-based supplement, will focus on development work carried out by environmental health practitioners, engineers and others in the developing world. There will be editorial on improvements in water and sanitation, rubbish disposal, lighting and accident prevention - interventions that can make an enormous contribution to health and well-being - with a stress on sustainable solutions, using local skills and knowledge.

The publication will also contain stories about educational work in developing countries (for example, assistance with diploma and degree courses), twinning arrangements between UK organisations and their partners and initiatives from the International Federation of Environmental Health, the Department for International Development, the NGO community, universities, and others.

For more information, or to suggest ideas for inclusion, contact **w.hatchett@chgl.com**

Indonesia after the Tsunami

The one and only time I met Dennis Kalson was in Los Angeles in the mid nineteen-nineties when he was Director of Environmental Health for the County of Solano, California. It was in another capacity however that he spoke that day when he gave a talk to the IFEH Council on the work of Public Health International. What he said has lived with me since then, as I have seldom come across an environmental health professional so dedicated to the cause of the health of the public. He talked about projects, which he had been involved with in parts of the developing World – in his case those countries in South America, where poverty is rife and basic health care is fairly limited, such as Peru.

In the eight or so years that have passed since then, I had not had regular contact with him but all that changed in late December 2004/early January 2005, when I learned that Dennis, as I would have expected from such a caring person, had volunteered to travel to one of the areas worst affected by the Boxing Day earthquake and consequent tsunami.

Since then I have made contact with him again and at the time of writing I have had from him seven very detailed accounts of the life that he is now leading, in the forefront of the relief efforts in Indonesia. The following are quotations from messages that Dennis has sent and which tell the extent of the damage that was caused to the countries which were affected but even more so tell about the people and their life under what must be very trying circumstances; circumstances that Dennis and his colleagues are sharing.

Dennis is working in Banda Aceh, which most readers will appreciate was one of the worst affected areas in the whole region. One of Dennis's first messages was entitled and ended with the observation "Colin Powell was not exaggerating when he described the scene as the worst that he had seen in all the war that he had seen".

Another very moving and heart-rending quote went as follows:

Of course there is sadness everywhere. People sometimes begin to drift off in mid-sentence and stare into the past, probably looking in their minds for lost loved ones. Every time we pass another truckload of corpses, the comment in the car from Acenese assistants is the same, "those are bodies, in that truck", then silence for a mile or two. But people are not crying in the daytime, because they are trying hard to focus on tasks at hand. One US engineer recently returned from the south says that as he walks through the settlements at night, he can then hear the crying through the plastic walls of shelters. "The displaced don't cry during the day," he says, "they only cry at night."

In the life that Dennis and many others are now living, there is much to take their minds off the sadness that pervades the whole area and he very nicely describes a typical day "at the coal face":

My job here in Banda Aceh has two parts. One involves field visits and environmental health assessments in small towns and villages on the outskirts of Banda where the homeless have gathered to live with villagers.

Often entire villages or neighbourhoods have resettled (or have been resettled) in villages not otherwise impacted by the dirty wave. They may be fully integrated into the host neighbourhood and housed in makeshift shelters adjacent to existing houses, or they may be settled into camps of anywhere from a few hundred to a few thousand residents. Sometimes the camps are on the grounds of the local Mosque. They are usually overcrowded, and poorly located for the purpose of temporary living.

I meet with camp leaders, military overseers and workers to plan for latrines, malaria control activities, improvement of water supplies, communal food facilities, garbage collection using young energetic Indonesian outdoor adventure enthusiasts and they help to organize and train village health workers to disinfect local wells, organize mosquito control brigades and eventually become village level partners in other disease prevention activities.

After the assessment and very rapid decisions on how to move ahead, it is just a matter of finding the materials to execute the plans. Even though the construction is simple, and many major components (water tanks, chlorine and plastic sheeting etc.) are flooding in, finding basic parts (even simple PVC pipe fittings) can take hours of moving from store to store. If you are lucky you

can find the necessary tees, elbows and nipples without having to jury-rig too much. A wide variety of parts is not plentiful since most of the major outlets that were not flattened by the quake, were smashed by the tsunami.

And, as if to keep a sense of "normality":

And then there are meetings; hundreds of meetings; and forms, hundreds of forms. Meetings and forms are among the downsides of working so close to the relief command centre.

The conditions, which met Dennis and his colleagues will be known to most of you who watched TV footage of the disaster but they take on a different dimension when you hear them described by someone who has experienced them first hand:

As one moves deeper and deeper into the face of the tsunami impact area, the feeling presses on your chest harder with every block, until you realize that all the air has been pushed from your lungs and you are gasping for air.

While much of the debris has been moved aside in major roadways, the alleys and passageways, lobbies of remaining buildings, are piled with the residue of a former life for this city in the same chaotic order as when the great filthy wave pulled back into the sea. There had been people walking here, hurrying to the bank, selling candy on the corner. There had been newsstands, and lines in front of the auto teller machines. There had been vendors rinsing the sidewalk, and crowds of people talking about the earthquake that had shaken Banda Aceh only 30 minutes earlier. The down-town was not just a backwater village of thatch-roofed houses on stilts; but it was a city with shops and banks and hotels and fabricators; and people; many, many people.

The debris piles looked like the active face of a landfill, a tangle of materials and plastic and wood and concrete and soil and muddy cloth. Few buildings were standing and they were open and hollow except for the mud, except for the debris.

The impact zone is heavily policed to keep looters away, but still there are people walking through the pile; still there are soldiers removing corpses, and even today, three weeks after the tsunami, even today in the rain, the smell of death hangs in the streets.

I can breathe again, but will never forget this sight. In a way, I am sorry I am witness to this reality. In a way I would be better not to know this truth. It's like having intimate knowledge of war and brutality.

Of course there are others toiling alongside Dennis:

So far, mostly doctors get ill. In general, they are the least careful; they eat poorly or irregularly, and refuse to stay properly hydrated, all in the name of work. Maybe it's the "dedicated doc" syndrome, but the illness rate is much, much higher than in the rest of the expat population. It's the docs that seem to get diarrhoea, fever, rashes, pallor, headache, nausea, malaise, moaning and groaning

The Nurses who assist the docs don't seem to get sick as much. Perhaps its because they smoke so much during the day and drink themselves to sleep at night. No microbe would dare take up residence. I really wouldn't know though; I'm not a doctor…..and in the environmental health arm, only one sanitarian: me.

There are some good administrative types, a really great epidemiologist person and a PR guy. The rest are engineers, with a heavy focus on hardware. And while the hardware part is really important in this phase, I think it's a mistake to forget the public health perspective that Environmental Health Specialists can bring in building sustainable systems.

The sites and sounds that Dennis describes are vivid and I am sure will live in his mind for all time:

The colonel in his dress greens yesterday was wearing bright yellow soccer shoes, looked down and said "these were my son's shoes; it is all I could find of him."

A kid's bicycle suspended over a cleared path through a flattened village, dangling from the remaining limb of a twisted tree, spokes woven with muddy straw, hanging only by a training wheel.

My driver who for the first time today could talk about releasing the hand of his new wife as the water pulled them apart after just 12 days of marriage. "She said good-bye with her eyes, and I knew I would never see her again. It was like your movie Titanic."

Later messages indicate an improvement, however slight, in the conditions facing the survivors and the relief workers:

Even though schools are doubled up because of displaced people, missing teachers and destroyed classrooms, the country has successfully managed the start up, and with assistance from UNICEF's school in a box program, most kids have a place to go every morning and face the future, rather than having to untangle the past. For the past month they have stood on the same line that I am straddling at this moment. They have faced the unimaginable pain brought by the dirty wave. But today, the 26th of January, things are different: school is now in session. Like the fertile rice field under my bare feet, things are beginning to grow again.

Things really are getting better though. These are resilient people. Families are already starting to rebuild. Sometimes it's just a single defiant flag over a lean-to on the slab of a former home, but it says were coming back.

I've been spending part of my day training a small team of villagers to purge wells, to blow out the seawater and crud. We've broken a few in the process by pulling water too fast, and women in the house complain; a healthy sign that says we want our house as nice as it was before. (Even when they complain, they treat me with respect, and call me Pa[k] Dennis, a warm gesture).

The most recent message gives a hint that Dennis has been changed for ever by his experiences as he talks of a break that he and some of his colleagues took on a journey to Singapore to undertake the inevitable form filling associated with renewing their visas to get back into Indonesia:

Even in China town last night, as we were carried through narrow streets and alleyways by a human river of revellers, the emphasis was on marketing and commerce and image; last minute shopping, everything must go, prices slashed on bright red decorations and cards and lanterns, pussy-willow stems and lucky bamboo. Deep into the passage, I found a lone, old calligrapher in a small booth who painted my new year's wish for this year of the cock. I looked up at the giant statue of the god of good fortune and hoped that his golden confetti would fall over me; that all of us will be fortunate this year, that the war-mongers stop their silly games and that the wealth of this great city may somehow find its way to those who have too little.

Receiving messages from Dennis has been very humbling, especially when one realises the sacrifices that he and others like him have made to assist those affected by the disaster and I am sure that all who read this will agree that he and his colleagues deserves our thanks and respect; but let us not forget that in other parts of the World millions are living in poverty and in need of the expertise of environmental health professionals simply to get through life.

Michael Halls, Honorary Secretary

The next meeting of the IFEH Council will be held in Vancouver, Canada on 8th & 9th October 2005

EVALUATION OF WATER ALLOCATION SYSTEM AT THE LOWER USUTHU BASIN IN SWAZILAND

Joseph S. Mtshali and Alfred F. Murye
Faculty of Health Sciences
Department of Environmental Health Sciences

Abstract

Hydrologic principles indicate that not only is no additional water created when irrigation demands increase, but more water is consumed at extensive margins of use (Huffaker et al., 2000). As the demand for water supply increases and shortages are created, the management of the resource is increasingly important. It is therefore important that the available water is committed to effective and efficient use. In the allocation of this scarce resource, while efficiency is paramount, equitable distribution should be a fundamental principle for apportionment if socio-economic sustainability is to be achieved.

This study was conducted to evaluate the water allocation system used to apportion water to sugarcane irrigators in the Lower Usuthu Basin of Swaziland; and to ascertain the efficiency and equitable balance of water apportionment among the water users. Documents from the Ministry of Natural Resources and Energy, meteorological office, Swaziland Sugar Association and the Big-Bend agriculture extension office were reviewed and interviews to assess the perception of stakeholders were conducted.

It was found that the water allocation system is not efficient but equitable. The main problem was the non-involvement of small-scale growers in the decision making process and that information dissemination to the farmers was inadequate. Water permits are not levied resulting in lack of resources for maintenance and enforcement of the law. Monitoring of abstraction and enforcement of the law is inadequate. While it can be said that the system is equitable, it is however too rigid in that it can not accommodate new comers to irrigation.

It is recommended that functions relating to water apportionment and monitoring be decentralized to the regions through establishment of a Catchment Council in which all water users will be represented. It is also recommended that water levies be effected immediately, the proceeds of which should be kept by the Catchment Council to finance activities of the Council. The Apportionment Board should continues to be supported by the state. A study should be conducted to evaluate possibilities of finding an alternative method of irrigation that will open-up the system to new comers.

Acknowledgement

Gratitude is owed to Dr Peter van der Zaag for his expert guidance, assistance and criticism throughout the study. We would also like to thank Pat Ntuli at the Swaziland Sugar Association for his co-operation and support, and the communal farmers for valuable information shared during the study.

INTRODUCTION

Sharing of international waters

While water is fundamental to life and prosperity it is also a vital, finite and fugitive resource. Water as a fugitive resource respects no boundaries and exerts a great influence to the environment and the ecosystem it passes through in the hydrological cycle. Water is a renewable resource replenished by precipitation but its occurrence in a particular region may be irregular and supplies used may be drawn at a rate exceeding the rate of replenishment. Hydrologic principles indicate that not only is no additional water created when irrigation demands increase, but more water is consumed at extensive margins of use (Huffaker, Whittlesey and Hamiton, 2000). It is therefore important that the available water is committed to effective and efficient use. In the allocation of this scarce resource, while efficiency is paramount, equitable distribution should be a fundamental principle for apportionment if socio-economic sustainability is to be achieved.

Water is unlike other resources, which are confined to specific localities; hence ownership can easily be ascertained. In contrast, most watercourses are shared by two or more riparian countries hence ownership of water is difficult to determine (Gareth, and Hamilton, 2000). If involvement of all riparian countries is not taken aboard in the development of watercourses,

development might be a source of conflict and instability in a region. It was for this reason that after the Second World War, the International Law Association (ILA) studied the application of law in sharing watercourses by riparian countries. The ILA developed the Helsinki Rules in 1966 (Piesold, 1997). The main principle of the Helsinki Rules was that each member state was entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of the international drainage basin (SADC, 2000). This meant that for any development of international waters there should be consultations between riparian countries before the development is carried out.

Triggered by the Helsinki Rules, many countries signed treaties and agreements with countries they share watercourses with, and this opened a window for escape from what could have become a source of conflict between riparian countries. Swaziland was not left behind; she also signed several agreements with her neighbours (South Africa and Mozambique) (Munyaradzi et al., 1996, and Piesold, 1997). When the Southern African Development Community (SADC) developed the SADC Protocol on Shared Watercourses in 1995, Swaziland had already signed several treaties with her neighbours (Munyaradzi et al, 1996).

Consultations between Swaziland and her neighbours also led to a draft of an interim water allocation agreement to guide the sharing of the riparian watercourses and monitor compliance. The interim agreement outlines the catchment areas riparian to these countries, irrigation development, and utilization of water. The Swaziland Ministry of Natural Resources (2000) said that the measurements of flows would be undertaken at appropriate river flow gauging stations and the Tripartite Permanent Committee (TPTC) would determine the location, installation and operation of the gauging stations. Although the agreements between Swaziland and her neighbours on shared watercourses date back to 1982, there has been very little that has been done in terms of sharing information on water flows and water use. However, Swaziland has drafted a policy to guide co-operation and co-ordination on watercourses development and water use in and outside the country. The draft waits to be passed by Parliament (Kenneth Msibi, Personal communication, Ministry of Natural Resources 2001).

Water allocation

Van der Zaag (2000) defines water allocation as the function of assigning water from a given source to a certain number of users. As the demand for water supply increases and shortages created the management of the resource is increasingly important. Effective management policies require a system for water allocation and water right administration that recognizes a private use of a public resource. Competition for a scarce resource needs to be regulated in order to achieve societal goals. The main aim of water allocation is to manage the resource so that the widely held public aspirations can be achieved (Teerink, 1993; Cambin, 1999). Over time the emphasis on water use may change and the allocation system should be able to respond to these changes. There are many systems adopted by different countries to allocate water for commercial and non-commercial use (Dinar, Mark, and Meinzen-Dick, (1999). Described below are some of the well-known allocation systems.

Prior appropriation system

This is a system where a person attains a user's right to a quantity of publicly owned water, when the water will be put to beneficial use, (Chapman, et al., 1995; Huffaker et al., 2000). The allocation is done on first come first served basis. This means that during time of water shortage, the longest term (senior) appropriators receive their full share regardless of whether the rest will have a share or not, if no water is left, then the shortest term (junior) appropriators receive no water at all. Water that is not put to beneficial use is forfeited and re- apportioned to other persons.

Public (Administered) Water Allocation System

This is defined as a situation where the state decides, allocates and distributes water among different users (Teerink, 1993). The allocation system acknowledges that it is difficult to treat water like most market goods, since water is perceived as a public good, and that large-scale water development is generally too expensive for the private sector, thus a need for government intervention in the development and water allocation.

Fractional Allocation System

Vos (1997) as cited in Natsa (1999) defines fractional allocation as a system where a user has a proportional share or percentage of the available water and this is independent of the amount of water available. The system can be practised with both flow and storage rights. In the case of flow rights, the right can either be in continuous flow or rotational pattern of abstraction at proportional bases. Fixed time of abstraction for each user is important in the case of rotational pattern. It is also important to measure the flow of the river periodically, especially when the flow is variable, so that the time of abstraction is adjusted accordingly for fair distribution.

Tradable water right system

This system consists of the right to consume, earn income from or sell the asset. The system involves enshrining legal ownership of the asset (water). Here, water rights have become in effect real ownership rights, conferring the rights of access, exclusion and alienation to the right holder (Binswanger and Mark, 1994).

Assessment of water allocation systems

Howe, Schurmeier and Shaw (1986) list the following criteria for assessment of appropriate means of allocation of water to achieve optimal use of the resource.

Flexibility: the resource can be shifted from use to use, place to place, as demand changes, making it possible to equate marginal values over many uses with least cost.

Security of tenure for established users: this is done so that users will take necessary measures to use the resource efficiently; security does not conflict with flexibility as long as there is reserve of the resources to meet unexpected demands. The users pay real opportunity cost of providing the resource, so that other demands or externality effects are internalised.

Equity: the allocation process should be perceived by the prospective users as providing equal opportunity gains from utilizing the resource to every potential user. Some variables that are relevant here are equity in terms of rights across sectors and within sectors. Especially important is how water abstractions within a sector are affected during water shortage. Are they affected in similar ways?

Efficiency: so that the form of allocation changes the existing undesirable situation, such as the depletion of ground water or water pollution and drives towards achieving desired policy goals.

Predictability of the outcome of the allocation process, so that the best allocation can be materialized and uncertainty minimized.

Political acceptability so that the allocation serves values and objectives of the society, thereby accepted by the various segments in society.

Administration feasibility and sustainability. The administration set-up should be sound in order to implement the allocation mechanism efficiently. Some important variables include: Who allocates the water (the judiciary or a public body)? Is water abstraction properly monitored? Is the water law enforced? Is the management agency adequately equipped to administer water allocation; and are users levied to ensure cost recovery of administration?

Ecological integrity consideration: this refers to environmental water requirements, mainly considered to avoid environmental degradation, safeguard the livelihoods for large segments of the population, and maintain aesthetic and scenic beauty. This criterion recognises in-stream water functions as part of sustainable water resources management. Some of these criteria and variable are used in this paper to evaluate the water allocation system in Swaziland.

Criteria for water allocation in Swaziland

The General Legal Notice No. 13 of 1973 amends section 69 of the Water Act (1967) and outlines the procedures in water apportionment with regard to agriculture and other activities of water use. The following are outlined as the criteria for water apportionment:

> The apportionment shall be calculated upon the normal flow of water estimated as being available in the river in the month of September at 80% non-exceedance probability. This normal flow is based on September flows and approximately 1 in 5 years low. For gauging station no. 6 at Siphofaneni on the Great Usuthu it is estimated at 9.1 m^3/s (Legal Notice no. 13 of 1973).
>
> An efficiency of use (water duty) in which it is deemed that, subject to the discretion of the board: In the altitude range 0 to 533 metres (approximately) 28 l/s is for 32 hectares or 0.875 l / s / ha.

The legal notice also makes it a condition that the permit owner should provide / install a water abstraction measuring/ control device at the point of diversion or abstraction, "as directed by and to the satisfaction of the Water Apportionment Board". The system of allocation adopted assumes that flow apportioned will be used for 24 hours each day or alternatively be diverted to storage for later use.
Should the flow at the gauging station fall below the normal flow (i.e. in the drought years) the irrigator will have to reduce his share and take his percentage of the actual flow.

Example, a farmer irrigates 80 acres of land and is entitled to 0.31% of the river flow at gauging station No.6 where the flow is 9.1 m^3/ s. When the river flow drops to say 5.7 m^3 /s (or 62.5 % of normal flow) his entitlement will be 0.31% x 5,700 = 17.6 litres / second which equals 0.542 l/s/ha (Legal Notice No.13, 1973) i.e. 62.5% of 0.875 l/s/ha.
An irrigator below the 533 metres altitude, while not permitted to abstract more than his basic percentage, may, but only if there is sufficient flow at the gauging stations, multiply his maximum permitted volume by a monthly factor below (Legal Notice no. 13 of 1973).

Objective of the study

This study was conducted to evaluate the water apportionment system to sugarcane irrigators in the Lower Usuthu Basin of Swaziland and to ascertain efficiency and equitable balance in water apportionment among the water users. The purpose of the evaluation was to define and judge the system, whether it is advisable to continue allocating water using the system or a change is required to facilitate equity, efficiency and sustainability in the water allocation.

METHODOLOGY

Evaluation of water allocation system in Swaziland.

Criteria for evaluation were developed, from recommendations of Howe et al., (1986) and were grouped under two main categories namely efficiency and equity, as shown in Table 1.2.

Efficiency of the system to allocate

To say that the allocation system is efficient in allocating water means that it should be able to provide a mechanism by which farmers can be able to estimate the amount of water they are entitled to in a given year, i.e., whether they can judge beforehand how much water they can count on, and therefore adapt their farming and irrigation strategy to that season's situation; this refers also to the clarity with which the content of the water permit has been defined and to whether the permit holders themselves fully understand the content of their permits.

For this to happen, the apportioning authorities should be able to monitor adequately (efficiently and transparently) water availability and water abstraction; this is crucial, since all permit holders need to trust the data and the decisions taken by the authority. Manzungu, Senzanje, and Van de Zaag, (1999) have argued that beneficial use of water resources should be part of the conditions for water permit allocation for the system to be said to be efficient. As part of the point to evaluate efficiency the researchers ascertained whether the Apportionment Board had a well defined source of funds (and/or revenue) to effectively conduct its operations. Thus here comes the issue of cost recovery. Are farmers paying for their permits? Where does the money go (to central government coffers, or directly to the water authority)? Another important point relates to accommodation of newcomers in the business: does the entry of new permit holders erode the permits of existing permit holders? Efficiency also implies that users should participate in decision-making in terms of water resources management.

Table 1.1 Factor used in adjusting water abstraction during summer months
Source: General Legal Notice No. 13 of 1973

	October	November	December	January	February	March
Factor	1.08	1.12	1.30	1.30	1.15	1.10

Equity of water allocation in the Lower Usuthu Basin

This is a very important element of any water allocation system. The system should be fair, and be able to meet social sustainability. An equitable system should therefore outline priorities across sectors while treating permit holders within a sector the same. This is done to protect people's access to the most essential uses of water such as drinking water for which there is no substitute. The system should have a provision to accommodate new comers in the business. This then means that the system should not grant water in perpetuity and permits should be reviewed at specific time intervals. Within a sector all permit holders should have in principle the same chance of getting their permit satisfied.

Setting of the study and population under the study

The study was conducted at the Lower Great Usuthu Basin. Two companies on private land, 19 associations and 15 individuals on Swazi nation land involved in sugarcane farming formed the population for this study. One company (as they are two) was conveniently chosen, and nine Associations and eight individuals were randomly selected. The Secretary to the Water Apportionment Board represented the Water Apportionment Board in the study. From the Associations selected eight members from each association randomly selected represented the Associations. Therefore 81 respondents were interviewed.

Table 1.2: The criteria used in the evaluation of the water allocation system in Swaziland adapted from Howe et al., (1986)

Criteria for evaluation	Variables	Indicators
Efficiency	Type of right	Property right or use permit
	Quantification of right	. How does the permit quantify the user right (e.g. fixed volume per time unit; or a percentage of flow; or an area to be irrigated etc.) How is the permit affected during water scarcity?
	Conditions	. Which conditions are attached to the permit: e.g. permit is attached to a \certain piece of land; condition of beneficial use; does the permit limit (specify) the type of water use permitted (e.g. only for irrigation, or only for the irrigation of sugar cane)
	Predictability	.Is permit holder able to predict this year's allocation of water? Are the procedures by the authority transparent and understood by permit holders?
	Efficiency and effectiveness of the water authority	. Is authority efficiently and effectively monitoring water abstractions . Have permit holders faith in the data so collected, and the conclusions derived? Does authority have sufficient means to carry out their tasks? . Do permit holders pay for the management service by the authority? . Do the Authorities monitor abstraction? .Does the Authority enforce the law
	Levy	Is the 'ownership' of a water permit levied or taxed?
Equity	Equality of rights across sectors	Do certain sectors have priority over others? Are basic water requirements for human needs protected?
	Equality of rights within sector	Are all permits treated in the same way; especially within one sub-sector (such as sugar cane irrigation)? Do all permit holders have in principle the same chance of getting their permit satisfied?
	Access to permits by new water users	What are the arrangements for new irrigators to obtain a permit? Will they have a similar chance of satisfying their water needs as the existing permit holders?
	Water shortage	Are all permit holders within one sector affected in similar ways in times of water shortage?
	Participation in decision making	Do users participate in decision making in terms of water resources management; or is this entirely the preserve of the water authority?

Data Collection Techniques

The following techniques were used to obtain data:

Interviews: A total of 81 respondents from the small-scale farmers (representing 80% of the small scale farmers) were interviewed to elicit information about the perception of the water users on the system.
Observations: The researchers visited the irrigation site for the purpose of observing the activities there and recorded relevant information.
Document review: Documents from the Ministry of Natural Resources and Energy provided data that included stream flow and water permits.
The Meteorology station: Documents provided information on rainfall, and pan evaporation.
Ministry of Agriculture Extension Office: provided records on the farmers actually engaged in sugarcane farming. Sugar Association: Data on harvested hectares and sucrose content.

RESULTS AND DISCUSSION

Type of quantification of water rights.

Type of right: is a user right and different permits are required for different uses. Water rights, by law are not transferable or leased without the knowledge and authorization of the Apportionment Board. It was discovered that small-scale growers do sell their water rights without the knowledge of the Apportionment Board, which is illegal.

Conditions: Permit is quantified both by area to be irrigated and percentage of the flow. The area to be irrigated is used when the water in the river equals or is above the normal flow of the river. The percentage system is used when the flow in the river drops to below the normal flow. All water rights are attached to land, a position, which was confirmed by the Apportionment Board. Beneficial use of water is one of the conditions for being awarded or to keep a water permit.

Predictability of water entitlement: Only companies are able to predict with some degree of accuracy the available flow of water in the river. Small-scale growers are not as they do not have access to such information. There is no official mechanism for information flows between Authorities and the small-scale farmers.

Efficiency and effectiveness of the water authority.

Administration: The Apportionment Board is a public Body that allocates public waters in Swaziland.
Clarity: Only 25% of the small-scale growers understand the contents of their permits.
Water charges: Water is free in Swaziland and Services are funded by the state. This is despite the fact that the Swaziland Water Act of 1967 (currently in operation) requires that services be levied and permits paid for.
Monitoring: Companies and small-scale growers unanimously agree that the Apportionment Board does not monitor their abstractions. The Apportionment Board confirms this, citing shortage of manpower and resources as the major constraint in the supervision of the water abstractors. Small-scale growers have not installed water-measuring devices at the point of abstraction as per the regulation and hence they do not have records of their abstraction. Companies on the other hand do measure and keep records of abstraction but the information is not publicly available.
Enforcement: The Apportionment Board does not enforce the rule of law. It is a requirement that farmers are to measure and keep records of water abstraction and make those records available to the Apportionment Board whenever required to do so, but the Board does not enforce this regulation. The Act also requires that the abstractors reduce their abstraction when the flow in the river drops to below the normal flow, which they do not, instead they opt to rotate their irrigation. According to information elicited from the water abstractors, bailiffs seldom visit them. It is a requirement that services are levied and permits are paid for but the Apportionment Board fails to enforce that.

Equity in the water allocation system

Hierarchy and equity

In the Lower Usuthu sugarcane irrigation is the only sector that abstract water officially. All permits are treated the same in the basin in terms of water use and quantity per hectare of land. The small-scale farmers complain that the system is not fair in terms of awarding water permits.

They say that companies are allowed to expand their irrigated land while they are refused. 90% of the small-scale farmers felt that the system is not fair in awarding water permits and 84% felt that the Apportionment Board favours the companies. The small-scale growers also feel that the system of awarding water rights is not transparent while companies feel that the system is transparent.

Information collected through observation

None of the small-scale farmers visited had gauging or measuring devices to measure their abstraction from the river. When they were asked why they did not have the devices, they said that the devices are expensive and difficult to read. When asked as to whether the bailiffs bother them about abstraction without the devices as per the law, they said that bailiffs do not bother them as long as they have a water permit.

Table 1.3 Small-scale farmers yield performance (Source: Extension Office annual records, Big Bend (2000))

Name sugarcane producer	area cultivated (ha)	average yield 1997-1999 cane (ton/ha)	average yield 1997-1999 sucrose (ton/ha)	Water righted (l/s)	righted area on water permit (ha)	area cultivated as % of permit
Madlenya irr. coop.	40.8	96	13.2	35.7	40.8	100
Magwanyane coop.	105.0	70	8.6	47	53.7	195
Kamdalantobi association	31.3	68	9.1	13.1	15.0	209
Mdobandoba coop.	99.9	83	10.9	141.4	161.6	62
Mgometulu individual	25.8	73	10.2	17.7	20.2	128
Ntengenyane association	54.9	100	13.7	67.5	77.1	71
D. Dlamini individual	24.4	110	14.7	17.5	20.0	122
Chief Madlenya individual	22.6	83	11.4	15.8	18.1	125
Vikani Association.	174.4	72	9.6	121	138.3	126
P. Mahlobo individual	29.9	113	12.9	26.3	30.1	99
Maphobeni association	55.7	86	11.8	35.5	40.6	137
Manyovu	34.6	85	11.8	13.5	15.4	224
Logoba Association.	83.9	81	10.9	63.2	72.2	116
Total / Average	783.2	82	10.8	615.2	703.1	111

During water shortages: According to the allocation system irrigators should reduce their abstraction by a percentage when water in the river drops to below the September normal flow. Judging the system from this perspective, it can be said that the permit holders are affected in the same way by water shortages because although they are not reducing abstraction by a percentage of the flow, they do reduce abstraction by rotating irrigation turns thus reducing the period of abstraction.

Accommodation of newcomers: The system is closed. It does not allow the entry of newcomers once the available water is fully committed. As long as a permit holder is using his allocated portion beneficially his permit cannot be adjusted in order to accommodate newcomers.

170 hectares of land belonging to some individuals was not farmed yet it was allocated water. This translates to 149 l/s and about 4.7 Mm^3 /an of water that is not used. When asked why, they cited financial constraints.

It was noted that farmers who farm more than 10 hectares of land are satisfied about the rewards in sugarcane sales.

All indigenous farmers are using sprinklers for irrigation. The sprinklers are driven by diesel engines installed on the banks of the river. The companies are using sprinklers and centre pivot system.

It was observed that most farmers were irrigating areas larger than indicated on their permits. When asked why, farmers said that they are to safeguard against yield loss in order to make sure that they meet the quota of sucrose as allocated by the Mill Company. They also felt that they have to expand their fields as the companies are expanding theirs.

Comments:

Small-scale farmers perform favourably compared to the overall country average yield of 13.6 tonnes sucrose per hectare of land. Farmers who cultivate less than 55 ha perform better than those who farm above 55 ha. Farmers who farm within the righted area perform better than farmers who farm beyond the righted area. About 70% of the small-scale farmers farm beyond the righted area.

Strength of the system

The following may be concluded from the information elicited from the stakeholders in water use and documentation from the Ministry of Natural Resources and Energy and are cited as strength of the allocation system:
The system practices a user rights type of permits. This is viewed as a strong characteristic of the system. Irrigators are given a user right, allowing them to use water for a specified purpose. Literature has shown that a water allocation system will serve the societal aspirations better if the resource remains the property of the state because granting full ownership of the resource to individuals would encourage rights to water to be traded which has a serious disadvantage of not prescribing beneficial use as conditions for the permit. These are crucial in efficiency of water use and sustainable development.
Demand separate permit for different type of water use. This is important to have control over use of the resource to ensure economic sustainability. Literature has shown that clear conditions on permits are important to specify the permitted use of the resource.
The rights are quantified by absolute volumes and by percentage of the flow. This is useful and practical when water is in abundance. In times of water shortage, the percentage allocation is used, whereby all permit holders share the burden of water shortage proportionally. This is believed to be an equitable system.

Weaknesses of the system in efficiency of allocation

The following are considered as weaknesses of the system.
Non-payment of water permits or services rendered despite the fact that the Water Act of 1967 allows the Apportionment Board to impose a charge on every person that holds a water permit during permit application and permit renewal. The act also empowers the Irrigation Board to impose a levy to recover cost of services rendered which is not done.
Monitoring of water abstractions is not carried out, yet the Apportionment Board has concluded that the allocation process has reached a critical stage where the dependable water has been fully allocated, hence a greater need for extra vigilance for abstraction and control. Many water abstractors have not installed such devices; hence no records on actual water abstraction are kept either on the abstraction site or at the Apportionment Board's office. This situation allows a water abstractor to abstract whatever he wants once he has acquired a water permit. It was not a surprise when some farmers were found to be irrigating more land than reflected in the water permit and quota allocated. This situation does not support economic sustainability.
Stakeholder participation has been cited in literature as paramount in economic sustainability and conflict resolution. It has been argued that services should be decentralized to appropriate levels to allow stakeholder participation. This is lacking in the Swaziland water allocation process. Activities are centrally administered with very little stakeholder involvement. This makes it difficult to explain issues to stakeholders because they don't know what is happening behind closed doors. That is why the Apportionment Board is trying in vain to explain why companies are opening up new land for farming while Indigenous Swazis are told there is no water. If all the stakeholders were involved or were represented in the structures governing their affairs they would have known that the companies had unused water and that companies have invested in water conserving technologies in order to expand their cultivated areas. The participation of stakeholders could also be a platform to explain to farmers the concept of

water allocation and what is meant by water shortage in the Lower Usuthu Basin. If the allocation continues to be done behind closed doors, the indigenous farmers will find it difficult to accept the decisions or outcomes made on their behalf without them participating.

Efficiency of water use is very poor. Irrigators use more water than allocated and irrigate more land than expected. This is evident from the hectares irrigated compared to the water allocated and the criteria of 0.875 l/s/ha as defined by General Notice No.13 (1973) (table 5.3). During field visits the researchers observed sugarcane fields that were not harvested yet due for harvesting. When inquiries were made as to why the cane was not harvested it was said that the farmer had produced more cane than he was allocated. The problem he now faced was how he was going to sell the surplus cane to the only buyer, the Sugar Mill, at a punitive price. In other instances, farmers would irrigate more land than supposed to and plant other crops adjacent to the sugarcane fields. The produce from the extra hectares is sold to an open market to evade the monitoring of water abstraction through the sucrose tonnage process. It should be said that there is no limitation to the sale of other cash crops in the open market unlike in sugarcane. Therefore the assumption of the Water Apportionment Board that water use can be monitored through sucrose production is invalid because farmers can use water in surplus of their permit for alternative crops.

Conclusion and recommendations

Efficiency: The system is not efficient. To improve the system it is recommended that functions that relate to water allocation and management be decentralised to the basin level where stakeholders will be actively involved. This may be done through an establishment of a Catchment Council in the basin. The logistics of involving the communal farmers on Swazi nation land should be studied further to incorporate the diversity and different interests of the small-scale growers.

Equity: It is concluded that the system is equitable in allocating water to irrigators. Water should continue to be allocated in absolute volumes when in abundance and in percentage when flow drops below the September normal flow. For long-term planning, it is recommended that a study be conducted to evaluate the option of construction of storage facilities along the Great Usuthu River. This could be a longer-term solution to the present water shortage crisis. Swazi nation land should be studied further to incorporate the diversity and different interests of the small-scale growers. Allocation of water rights, monitoring of abstraction and maintenance work may then be done at the catchment level. The Apportionment Board can then supervise the activities of the council and enforce the law. It is also recommended that the enforcement of water levies be effected immediately and the proceeds be kept within the Catchment Council in order for it to effectively execute its monitoring tasks while the Water Apportionment Board continues to be supported by the state. It is recommended that the law be reinforced in relation to irrigated area. Farmers must irrigate within the allocated area to allow others to have a share of water rights. The opportunity of expanding irrigated area through improvement of irrigation efficiencies should be accorded to all farmers.

References

Binswanger P., Mark W. R., (1994), Markets in Tradable Water Rights: Potential for Efficiency Gains Developing Country Water Resource Allocation. World Development Bank, Volume 22 No 11. Washington.

Cambin J., (1999). Draft Interim Water Allocation Plan. *Water Resource Allocation and Planning Series,* WRAP2. Western Australia.

Chapman, R. A., Manders, P.T., Schales, R. J., and Bosch, J. M., (1995), Who should get the Water? Decision Support for Water Resource Management, Division of Forest Science and technology, CSIR, Pretoria.

Dinar A. Mark W. Rose g. and Meinzen D. (1999), Water Allocation Mechanisms- Principles and Examples. World Bank, IFPRI.

Gareth P. G., and Hamilton J. R., (2000). Water allocation, transfers and conservation: Links between policy and hydrology. *Water Resources Development* 16, no. 2: 23-57

General Notice No. 13 of 1973, Water Apportionment, Lower Usuthu Control Area. Ministry of Natural Resources, Swaziland.
Howe C., Schurmeier D., and Shaw D., (1986).

Innovative Approach to water allocation: The potential for water markets. *Water Resources Research* 22(4): 439-445.

Huffaker R., Whittlesey, N., and Hamilton J., (2000). The role of Prior Appropriation in Allocating Water Resources into the 21st century. *Water Resource Development volume* 16, No. 2: 15-29.

Manzungu, E., Senzanje, A., and Van der Zaag, P., (1999), Water for Agriculture in Zimbabwe: Policy and Management Options for the Smallholders Sector. University of Zimbabwe, Harare.

Munyarandzi, C., Chivasa, M., and Alexandra S., (1996). Water in Southern Africa. Southern African Development Community. World Conservation Union , Harare, Zimbabwe.

Natsa T. F., (1999). From Priority date to Fractional Allocation; towards equitable distribution of surface water resources in Zimbabwe. MSc Thesis, University of Zimbabwe, Harare.

Piesold, K., (1997). Water Sector Situation Report. Ministry of Natural Resources, Swaziland.

SADC, (2000). Guidelines for Co-ordination and Networking. Water Sector Co-ordination Unit. Maseru, Lesotho.

Solanes, M., (1983). Irrigation users organizations in the legislation and administration of certain. Latin American Countries. Paper 24, FAO, Rome.

Swaziland Draft Water Policy, (2000). Unpublished paper. Ministry of Natural Resources, Swaziland.
Swaziland Government, (1967). *Water Act*. Government Printer, Mbabane.

Swaziland Sugar Association, (1994). Sugarcane Farming in Swaziland, Small-scale Growers. *Swaziland Journal volume* 4, No.1. 1994: (14-15)

Swaziland Sugar Association, (2000). Swaziland Sugar Association fact sheet, August 2000, Mbabane, Swaziland.

Swaziland Water Bill, (1998), No. 1998. Ministry of Natural Resources and Energy.

Teerink, J. R., (1993). Water Allocation, Rights and Pricing. Examples from Japan and United States. *World Bank Technical Paper* Number 198. Washington D.C.

Van der Zaag, P., (1999). Water Allocation Principles in Catchment areas: Some waters as constrains and opportunities. In Manzungu et al

Water for Agriculture in Zimbabwe: Policy and Management Options for the Smallholders Sector. University of Zimbabwe, Harare. (168-178).

Van der Zaag, P., (2000). Water Law. Lecture notes, Dept. of Civil Eng. University of Zimbabwe, Harare.

In the next edition of Environment and Health International there will be an article entitled

INDUSTRIAL SOLID AND LIQUID WASTE POLLUTION IN THE LIMBE RIVER, MALAWI

by Engelbrecht. J.C., Taulo. S.E and Chipofya. V

Volume 7 Number 2 2005 is due for publication in the autumn of this year

The Royal Environmental Health Institute for Scotland Annual Conference will be held in Perth, Scotland on 16th – 18th November 2005.

Further information is available on the Institute's website

www.rehis.org

Daventry Friends Of Iganga

Let's go to Uganda in 2005

Daventry District Council Health Professionals have been working in Uganda since 1997 on Community Projects involving Environmental Health. This work has been in and around the town of Iganga in the east of the country.

In 2005 a party of interested people including other health professionals will visit for 17days **from the 19th May** to take part in health projects, meet Ugandan Health Professionals including their new students, visit local communities and experience real Ugandan life at all levels. Time will be included to visit the Source of the Nile, at Jinja on Lake Victoria, and walk on the slopes of Mount Elgon at 10000ft. *Are you interested ?*

COST approximately £1000 (including discounted direct BA flight)

If so contact Peter Minhinnett on 01327 302549 work, 0116 2393061 out of hours or peter@minhinnett.fsnet.co.uk.

- *Work with local Health Professionals. Provide new or repair existing water supplies to ensure good quality drinking water for a community. Assist with health promotion advice in villages and work along side Ugandans.*
- *Visit Makere University in Kampala and meet Student EHO's on their new Degree course and exchange ideas and information.*
- *Visit the Source of the Nile, Lake Victoria and experience 'Real' Uganda.*
- *Walk on the slopes of Mount Elgon on the Kenyan Border at 10000ft*

Fancy a holiday experience with a difference where you can use your skills and do something worthwhile for people in a developing country, whilst at the same time have a holiday to remember for the rest of your life? ..... Then start getting involved with other health professionals and their work in developing countries.

This Trip is being organised by Peter Minhinnett, Principal EHO at Daventry District Council, and Founder Member of 'Daventry Friends of Iganga', a registered charity. He has worked in Uganda on seven occasions since 1998 and worked in Zambia before that. The East Midlands Centre has recently formally linked with the Ugandan Public Health Officers Association and supports this visit as another step in developing links with Ugandan Health Professionals.

Peter is also a Trustee of the Charity 'Water for Kids' which is supporting this visit to Uganda in 2005 as its official Study Tour.

Water for Kids

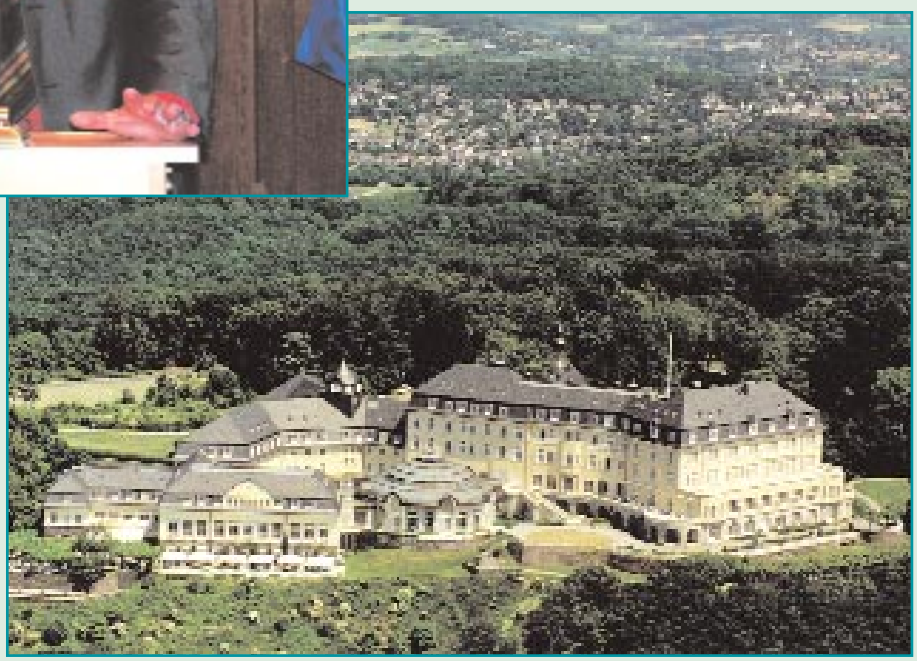
Bundesverband der Lebensmittelkontrolleure (BVLK) Conference 5th – 7th September 2005 Petersberg

The Bundesverband der Lebensmittelkontrolleure (BVLK) in Germany is holding its Biannual Conference at the Government's Guest House at Petersberg near Bonn from 5th to 7th September 2005. This conference is open to all professionals, who have an interest in environmental health and in food safety in particular. There will also be an exhibition and space to exhibit is still available for interested firms and companies.

The fee for participation in the conference is the same for members of the IFEH as for the members of the BVLK, namely Euro 150, which includes all events, food and beverages during the conference programme but not accommodation. This can be arranged at reasonable prices.

For further information, please contact the website of the BVLK, which you can reach through a link on the website of the International Federation.

BVLK Chairman, Henning Veldt



Conference Venue: Government's Guest House, Petersberg