



WATER & RISK

Editorial

Dear Colleagues,

a few days ago I received an email from a friend based in South Africa. She thoroughly enjoyed the recent football World Cup, but now the games are over and after a few weeks of amazing experiences with visitors from around the world, her world is coming back to reality again. This also means that the problems of daily life are becoming visible again and there is no longer a reason to escape from them. Just kilometres away from the wonderful stadiums extreme poverty exists at a level that threatens daily life. This includes poor sanitary conditions, often with open toilets surrounded by tin shelters. South Africa is still struggling with inadequate sewerage infrastructure and critical voices ask if the money invested in stadiums would have been better spent on infrastructure.

Nevertheless next to our doors we can also find backlogs in infrastructure provision and instead of pointing to others, we need to get involved in taking care of our own neighbourhoods. To do this, we need to obtain information about existing situations and find a way to get involved. Countless initiatives work on public participation. One example of this is the involvement of schools in water and sanitation projects. School projects can help to mobilize communities and to raise interest for neglected topics. The eyes of children look differently at our world and they often ask the right, although sometimes painful, questions. Similarly, our point of view can change when we encounter different cultures. What might look normal to us can be very strange for someone from a different cultural background. If we keep our eyes and minds open, we may gain new insights.

Covering up problems does not solve them. Recognizing problems and opening them up to discussion means that we cannot neglect them anymore and paths to solutions open up.

I hope that you enjoy this edition of the newsletter, which includes reports on projects from Romania and Burkina Faso which underline the importance of public participation and a report on the Atlas of Water and Health, a newly developed tool to visualize water sanitation and health data.



Andrea Rechenburg
WHO CC for Health Promoting
Water Management & Risk Communication

Water Safety Plans for small-scale water supply systems in Romania

Introduction

The World Health Organisation (WHO) initiated Water Safety Plans (WSP) (1), which are to be considered as a part of the WHO guideline on drinking water quality. The WSP is a concept for developing a process-orientated observation of the water supply and its goal is to identify and eliminate all possible risks in the entire water supply system: from the potential risks of water pollution in the catchment area, all the way along the line to the consumers. Risks need to be identified which could affect water safety and human health at every stage of the water supply. Once risks are known, measures to minimise and manage the risks need to be specified. The final products – maps, posters, reports, safe water strategies etc. – give the local community information on how to avoid the risks of pollution. Within the framework of a project in Romania WECF modified the WHO publication on WSP in such a way that non-professionals such as schools or others can use the information and the materials for developing WSPs for small scale water supply systems, such as dug wells, bore holes or public taps in their own villages.

Romania

In many rural areas of Romania it is not access to water per se, but rather access to safe water that is often a big problem. According UN statistics, in 2006, 99% of the urban population had access to an improved water source, but only 76% of the rural population (2). However, having access to an improved water source does not necessarily mean that the water is safe (3).

In Romania, poor sanitary conditions and the mismanagement of human and agricultural waste cause the pollution of ground and surface water with nitrates, faecal bacteria and pesticides. 7 million people in rural areas of Romania mainly obtain their drinking water from unprotected wells and use conventional pit latrines in their yards, which pollute the groundwater. Safe human and animal excreta management is generally lacking.

Among both citizens and local authorities low levels of awareness exist concerning the relationships between man-made pollution of water sources, water quality and related diseases. In villages with small-scale water sup-





Fig. 1: Poor sanitary conditions and the mismanagement of human and agricultural waste cause the pollution of ground and surface water
Source: Margriet Samwel



ply systems financial mechanisms or structures for water monitoring and water protection measures are often not available.

Even though Romania has adopted European Union (EU) drinking water legislation, the drinking water quality from private wells and also many public wells is not controlled and often not protected against contaminants. This is a result of a loophole in the EU directive, which excludes drinking water systems supplying less than 50 people or 10 m³ per day (4). The responsibility for drinking water supply, wastewater disposal and treatment lies with the local authorities, whereas water users are obliged to prepare and apply their own plans for the prevention and control of accidental pollution that might occur as the result of their activities (5).

WECF experience

Over several years in cooperation with local partners Women in Europe for a Common Future (WECF) has been observing and monitoring water pollution in small-scale water supply systems such as bore holes and wells in rural areas of Romania. In addition to bacteria, WECF identified nitrates as one of the substances that often pollute drinking (ground) water. Nitrate concentrations in drinking water are far more easily measured than bacteria using nitrate quick tests, and therefore nitrates can serve as an indicator for man-made (anthro-

pogenic) water pollution. In WECF's experience, proving severe anthropogenic pollution of drinking water via water tests often does NOT trigger any action by local or regional authorities to start water protection measures.

Water Safety Plans, involving schools

To address the above mentioned problems and achieve the specified aims, WECF created an educational package (WSP toolbox) for schools; to develop community-based Water Safety Plans (WSP) for local small-scale water supply systems such as wells, boreholes and public taps. The aim of the activities to develop WSP for small-scale water supply systems involving schools has been to build local capacity and strengthen and mobilize the community to improve access to safe drinking water. The selection of the target area was based on that of the ongoing WECF project 'Safe Water, Sanitation, Health and Dignity'(6). The villages were selected based on there being a school with teachers who were interested in participating in the project (Table 1). None of the target villages is served by a central water supply network or sewerage system. Apart from individual wells, the villagers of Cosereni, Tiganesti and Izvoarele sometimes also use public taps. Izvoarele has a pipe that supplies 220 inhabitants. All the families of the target villages are served with water from the first groundwater aquifer, at a depth of 3 to 50 meters.



Fig. 2: Seven million people in rural areas of Romania mainly obtain their drinking water from unprotected wells
Source: Margriet Samwel WECF



Fig. 3: The responsibility for drinking water supply, wastewater disposal and treatment lies with the local authorities
Source: Margriet Samwel WECF



County	Village	No. of Inhabitants
Giurgiu	Pietrele	2300
Ialomita	Cosereni	4820
Mehedinti	Garla Mare	3500
	Vrata	1500
Teleorman County	Cervenia	3362
	Tiganesti	5620
	Izvoarele	2900
	Contesti	3676
	Beiu/Storobaneasa	3735

Table 1: Selected villages

Methodology

The target groups are the people of the rural areas, with a focus on schoolchildren. Children will work with the support of their teachers and other stakeholders for safe drinking water, sanitation and health.

WSP Tool kit

WECF's WSP tool kit provides schools and other stakeholders with a WSP manual with background information about the aims of the WSP, which covers the properties of drinking water and sources of pollution and related health risks (7). The tool kit contains materials and instructions for carrying out simple water tests, questionnaires for collecting information from citizens, local health authorities and local authorities responsible for water sources. Additionally, the tool kit includes sanitary inspection forms on the current state and potential risks of wells, based on the sanitary inspection forms published by the WHO (8). After training the teachers, the schools carried out the WSP activities from November up to the end of the school year in May or June 2009.



Fig. 4: Using nitrate quick tests ,and therefore nitrates can serve as an indicator for man-made (anthropogenic) water pollution
Source: Margriet Samwel , WECF

Results and experiences

The teachers and pupils of the participating schools were very motivated and enthusiastic about the activities, because they were seen as practical, educational and relevant to the local environment. The results depended to a considerable extent on the motivation and available time of the teachers and the pupils and on the support of

the local NGO. Most schools identified the tasks and activities together with the pupils. Approximately 500 water samples were tested for nitrates and other simple tests like turbidity or colour observations were carried out. Some schools invited speakers from the health or water authorities and many schools presented the results to the public. Most schools organised contests on clean wells and water, or children wrote poems related to water. Local inhabitants, doctors and mayors were interviewed about water perception, problems and related health risks. Most schools identified and formulated the actions that needed to be undertaken by their community to improve the water quality

The results of the water tests and the risk assessment were presented to the community and served as a basis for further discussion and action. Collaboration with the local administration and environmental institutions was initiated.

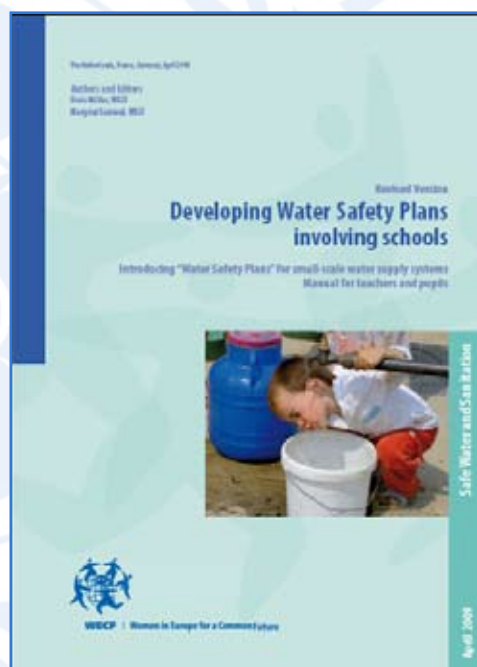


Fig. 5: WSP manual with background information about the aims of the WSP
Source: Margriet Samwel , WECF

The wells in the villages are affected by severe water pollution. Even spring water extracted from a depth of 20-30 meters reached the maximum nitrate value of 50 mg/l set by the EU. More investigation would be needed to clarify the extreme fluctuations in the nitrate values in the wells. For example, ammonia analyses could indicate if less animal and human excreta entered the groundwater. If the soil is water-saturated due to heavy rainfall the rate of oxidation of ammonia into nitrates decreases (9). A decrease in nitrate concentrations in wells during the winter was observed in nitrate-polluted wells in other Romanian locations (10).





Fig. 6: After training the teachers, the schools carried out the WSP activities
Source: Margriet Samwel, WECF

Results of interviews

Finances and quality control

The WSP team from 6 schools interviewed those responsible for the water supply. In most cases this was the mayor of the village. From the interviews pupils found out that if public taps are available the authorities ask the users to pay 2 RON (approximately 0,5 Euro) per cubic meter of water. The citizens pay this as an annual tax. The water provided by the public wells is free.

The money raised via metering is the only income generated and budgeted for the operation and maintenance of the system. Other budgeted income sources do not exist. Communities relying on public and individual wells have no budget for operations and maintenance. However, it was mentioned that the communities carry out a check of the water quality of public wells once or twice a year. The water quality monitoring of the public taps was carried out every three months (two communities) or rarely (one community).



Fig. 7: Seminar

Source: Margriet Samwel WECF

Accessibility of information and plans

All those responsible for water that were interviewed mentioned that the results of the analysis are accessible to interested and/or authorised persons and also the public. Only one respondent was not aware of this. However, only half the mayors stated that they have the results of the water analyses. The following question was posed to local medical personnel: "Have you ever received the results of the water analyses of the water supply/sources of the village?" With the exception of one doctor, all answered in the negative. One person said in their interview that "I know that it is only done rarely and only on our request".

Water quality and diseases

The local doctors from 6 villages completed the questionnaire. The following question was posed: "In your opinion what is the main problem concerning drinking water in the village and are there water-related diseases?"

Two doctors mentioned pollution by animal faeces, septic tanks, a lack of sewerage and the fact that water is not tested or protected.

In three villages served with public taps the main problem mentioned was patchy or intermittent water supply. One doctor stated that there are no problems concerning the drinking water.

In Cosereni the patchy water delivery was mentioned, whereas the quality was considered to be good. Regarding water quality, the doctors of the four other villages mentioned the high levels of nitrates and water contaminated with Giardia. With one exception, all the medical staff interviewed, advise patients to boil water before consumption.

The doctors were asked if there have been cases of blue baby disease (Methaemoglobinaemia) or typhoid fever in their villages during the last 3 years. Only one case of blue baby disease was reported.

In answer to the question "what is the main illness related to drinking water quality in the village?" the medical staff of the target villages mentioned:

Cervenia (Te): Giardia lamblia (parasitic gastro-intestinal infection), enterocolitis (inflammation of the colon and small intestine), nitrate intoxication

Izvoarele (Te): None

Tiganesti (Te): Microorganisms in the flora which grow on the walls of well shafts can cause parasitic diseases like Giardia, dysentery, Trichomonas, hepatitis.

Cosereni (Ia): None

Pietrele (Gi): Urinary lithiasis (stones in the urinary tract)

Garla Mare (Me): Methaemoglobinaemia



Furthermore, a question about the occurrence of tuberculosis and thyroid diseases during the last 3 years was posed. In 2 villages no cases of tuberculosis were reported; in the other four villages 4-5 cases were reported. Although thyroid diseases are not related to microorganism-infected water, the question about the occurrence of this disease was included in the questionnaire because there is a relationship between increased nitrate concentrations in water and thyroid diseases (11). In 4 villages the local doctors mentioned that several cases of thyroid diseases had occurred.

7. Discussion and future perspectives for WSP

In most of the target villages the findings of the WSP-teams showed a severe nitrate contamination of the first aquifer, the causes of which are mainly "home-made". After Romania's accession to the EU one of the country's obligations is compliance with the drinking water quality parameters by 2015. In Romania the water sector is the most demanding environmental sector and the total estimated investment costs for compliance with EU Directives is 19 billion Euros; about 8.6 billion Euros are needed by 2013, of which 4 billion Euros are covered by EU and national co-financing (2009). The long-term objective for rural areas is to reach a coverage level of 85% of the population having access to a safe water supply by 2020 (12).

A safe drinking water supply with community involvement should be ensured in rural areas, a section of Romanian society (some 12.000 villages) that has previously been completely neglected. The first steps to solve the causes of polluted water should be to raise awareness at all levels, obtain public participation and support and follow up with concrete water protection measures. For many regions, the WSP programme could form the bridge between local communities, regional and national authorities and contribute to the realisation of the targets set by the Protocol on Water and Health and the objectives set for the rural areas.

To scale up this WSP programme and to bring the local findings and experience up to national level, the issue should become obligatory in the school curriculum.

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In the next edition of this newsletter a case study from the application of the WSP in Romania will be presented

Margriet Samwel
Women in Europe for a Common Future
- WECF
<http://www.wecf.de>



The Atlas of Water and Health

Introduction

Although high standards of drinking water and sanitation have been reached in some countries, outbreaks of waterborne diseases continue across Europe, and minor supply problems are encountered in all countries. Reliable data are lacking on the quality of water sources and the drinking water that is supplied. The detection and investigation of outbreaks is poor in many countries. An important challenge is to establish a coordinated approach for data collection, processing and management to support decision-making and to improve the reliability of environmental information (Bartram et al. 2002).

The Atlas of Water and Health is a Web-GIS application (www.waterandhealth.eu) developed for the collection, processing, management and presentation of WHO European country data concerning water, sanitation and health. It provides maps and factsheets containing selected information on water and health in Europe.

The background to the development of the Atlas lies in the update of the 2002 document "Water and Health in Europe" which was the evidence base for the 1999 Ministerial Conference on Environment and Health. The update identifies many of the issues covered by the Protocol on Water and Health, especially Article 6, Paragraph 2, target and target dates, which requests



“the Parties to establish and publish national and/or local targets for the standards and levels of performance that need to be achieved...” For a periodic revision of these targets, Parties shall make appropriate provisions for public participation covering amongst others the reduction of the scale of outbreaks and incidents of water-related disease (Article 6, Paragraph 2). The Parties shall collect and evaluate data on their progress towards the achievement of the targets and on that basis each party shall review periodically this progress and publish an assessment of this progress (Article 7, Protocol on Water and Health).

The Atlas

The Atlas of Water and Health serves as a basis for the collection and evaluation of data from the countries of the WHO European Region. It integrates country profiles for European member states that bring together information on water and health. The first edition of the Atlas has been available online since March 2010 and features two main applets (maps and fact-sheets) for the combination, presentation and communication of country data. The map applet can be used to produce thematic maps relating to water resources, drinking water and sanitation coverage as well as the mortality and morbidity of water-related diseases. The factsheet applet can be used to generate country factsheets on water resources, water supply and sanitation as well as water-related diseases and thematic factsheets on a selected theme providing data for all countries of the WHO European Region.

The Model

The Atlas of Water and Health is a Web-GIS application, which can be described as a process of designing, implementing, generating and delivering maps on the World Wide Web. It is developed by using the Open-

Source-software GeoExt, a web mapping framework combining the JavaScript framework Ext JS and the geospatial JavaScript library Openlayers. This architecture allows the Atlas to be run online as well as offline on an USB flash drive. This is a clear advantage over other existing online Web-GIS applications, which are only available online.

The Atlas offers a user-friendly web-interface presenting animated maps and factsheets in one application. In the first release data from the existing databases are available for the following years:

- Joint Monitoring Programme: 1990 and 2006
- European Health for All database: 1999 to 2008
- Centralized Information System for Infectious Diseases: 1999 to 2008
- WaterWiki: varies depending on the original data source

On the website (www.waterandhealth.eu) three general modes can be chosen: the map, bonus map and factsheet applet. Via the map or bonus map applet a theme may be selected from the list. Via an automated SQL request to the database (MySQL®) an animated map for the selected theme is generated. To create a factsheet, a specific theme or a specific country from a list/ map is selected. The thematic or country factsheet is also created via an automatic SQL request to the database.

Maps and factsheets

The map and bonus map applet present different thematic maps relating to background information, water and health, human development, water resources, drinking water and sanitation as well as primary and emerging diseases. The figure below shows an animated map of the age-standardized diarrhoeal death rates (SDR) for children under five years of age per 100,000 population.

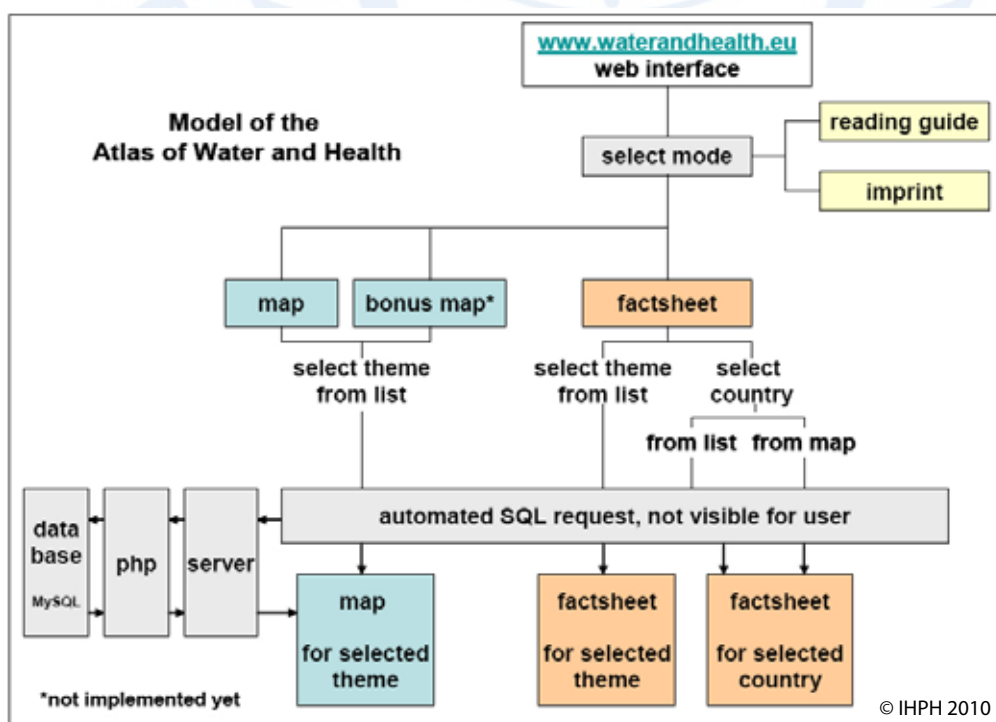


Fig. 1: Model of the Atlas of Water and Health



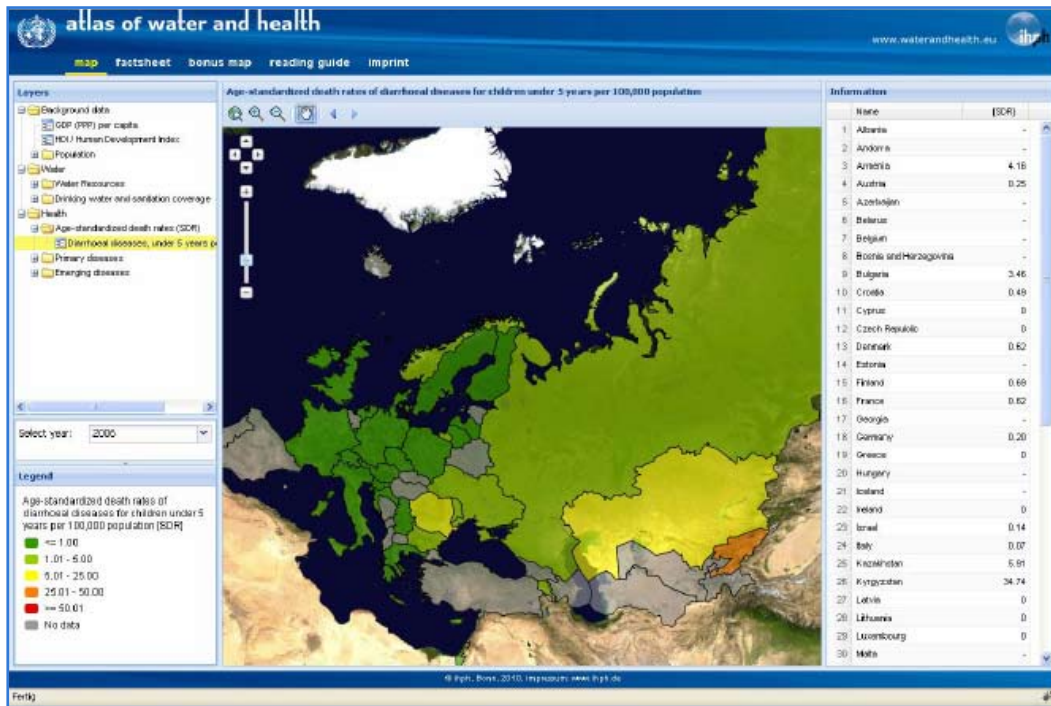


Fig. 2: Map of age-standardized death rates (SDR) of diarrhoeal diseases for children under five years of age per 100,000 population (2006)

Specific information for every country is shown by clicking on the country map. The data for the selected country are highlighted in an attributes window, which gives an overview of all country values.

A factsheet for a selected country is generated either by clicking on the map or by selecting it from the country list. The country factsheet offers a comprehensive overview of all important water and health themes included in the Atlas. By selecting a specific theme in the list e.g. the Human Development Index (HDI), a thematic factsheet containing the HDI of all countries of the WHO European Region can be generated.

Future prospects

The further development of the Atlas includes on one hand a continuous update, i.e. the collection and integration of current data from the countries of the WHO European Region from existing databases (JMP, HFA-DB, CISID, WaterWiki) and on the other hand the continuous maintenance and update of the technical back-end, in particular the implementation of bonus maps showing cartograms (value-by-area-maps) of selected themes offered by the Atlas (Figure 4), in which the area of the country is scaled in proportion to the thematic variable. In Figure 4 the total population in the WHO European

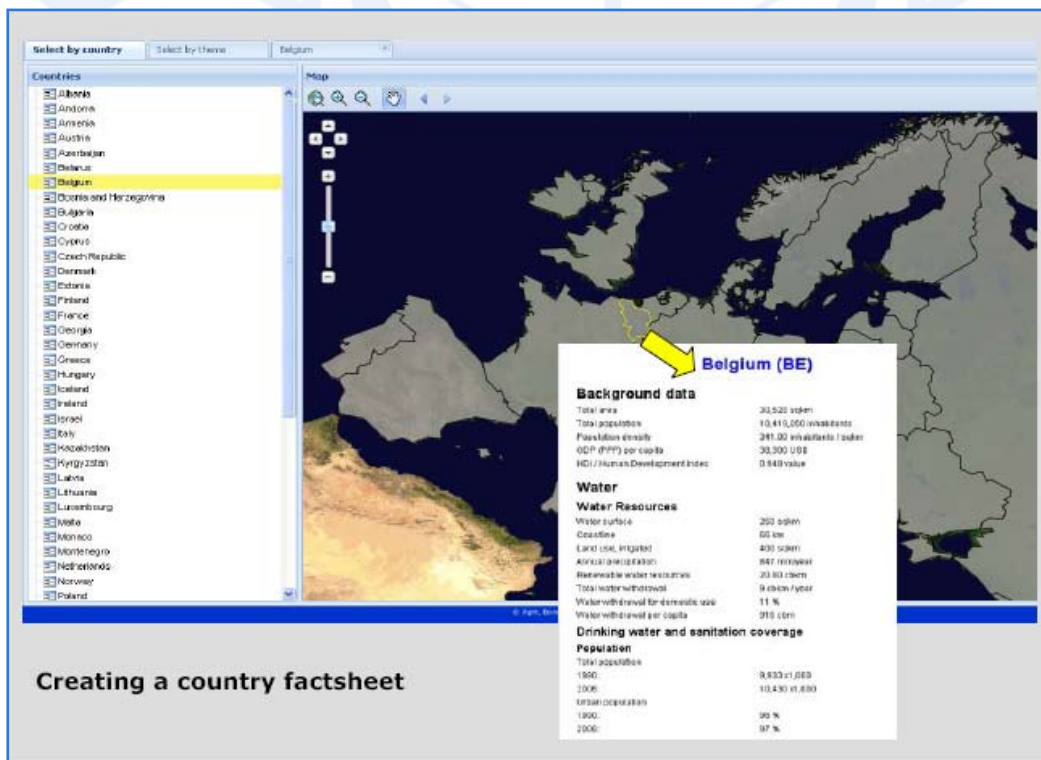


Fig. 3: Creating a country factsheet (using Belgium as an example)



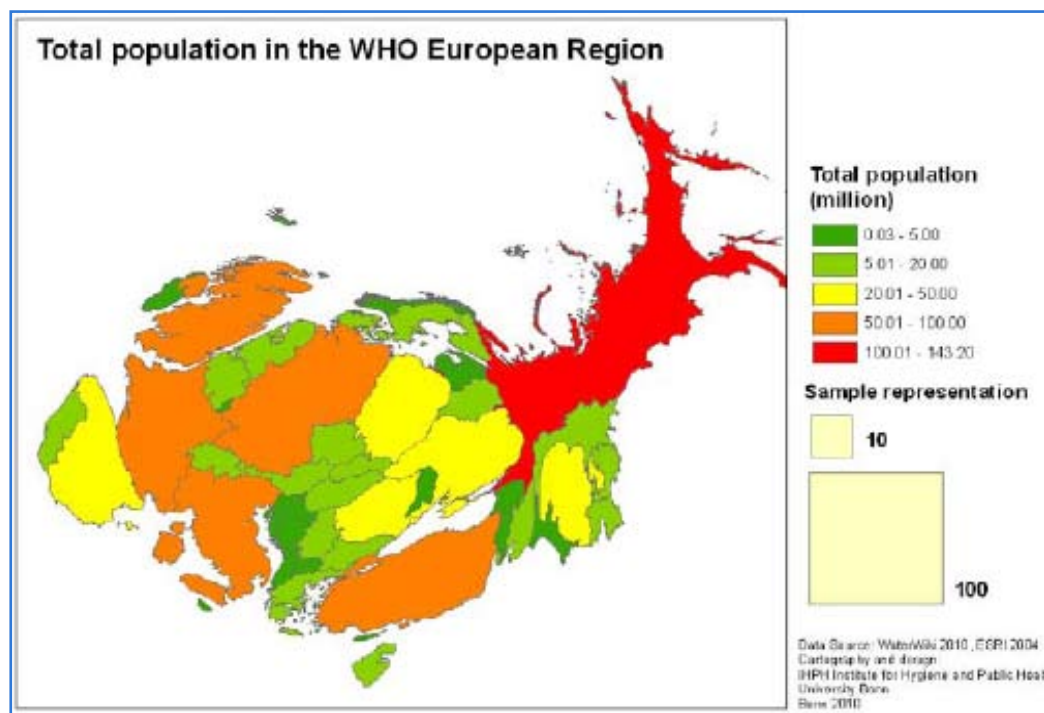


Fig. 4: Example of a cartogram (value-by-area map)

Region is visualized using a cartogram. The size of the country changes depending on the total population value. Such a map illustrates the relative sizes of the populations of countries by scaling the area of each country in proportion to its population.

Conclusions

The Atlas of Water and Health is an important instrument to manage and evaluate data in order to review, communicate and publish WHO Euro country information concerning water and health in an attractive, clearly presented way. Such a Web-GIS tool helps to give a better insight into conditions with regard to water resources, water supply and sanitation as well as water-related diseases. It could serve as a basis for the development of national or regional Web-GIS applications in the context of water and health, because functions of this interface can be easily added or modified. This is an important advantage of using an Open-Source-software. Thus the platform of the Atlas could also serve as a tool to review and publish the progress of countries towards achieving the targets referred to in Article 6, Paragraph 2 of the Protocol on Water and Health.

The Atlas of Water and Health was developed by the WHO CC for Health Promoting Water Management and Risk Communication in Bonn.

For further information contact the following e-Mail address: info@whocc-bonn.de or visit our web-site

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Ina Wienand
 Institute for Hygiene and Public Health, Bonn
 Medical Geography and Public Health
ina.wienand@ukb.uni-bonn.de



Tobias Frechen
 Institute for Hygiene and Public Health, Bonn
 Medical Geography and Public Health
tobias.frechen@ukb.uni-bonn.de



<http://www.waterandhealth.eu>

“Elephants and Butterflies on Moon” – My Internship in a NGO in Ouagadougou, Burkina Faso

Developing countries are often ignored by the industrial nations in the global discussion on climate change and CO₂ emissions. This is paradoxical, because the countries which contribute the least to CO₂ emissions and thus to anthropogenic climate change are often the most affected by the negative consequences of climate change. This is the case for the sub-Saharan state of Burkina Faso, which occupies position 177 from a total of 182 countries represented in the Human Development Index. According to the HDI Ranking of the UNDP, which is calculated from life expectancy at birth, literacy rate, rate of total debt to gross domestic product per capita, Burkina Faso along with 5 other nations is one of the “least developed” countries in the world.

The question is: Which industrialized nation takes a country that has a literacy rate of 28,7 % as a serious discussion and economic partner? How is spreading information to the broader population possible under these conditions, in order to guarantee the creation of independent opinions?

The mission of „Butterflies and Elephants on Moon“ (BEoM) projects is to promote civic education and political engagement in a population that barely has access to knowledge. In this way, a dialogue between the “elite” and the “under-class” of the population should be achieved, in which the organization acts as a mouth-piece. This should guarantee that the population are able to make independent judgements on global issues and are protected against patronizing “experts’ judgements”. BEoM projects provide a clear formulation of the population’s own demands. Important principles of BEoM projects are to respect unconventional lifestyles, and recognize freedom of choice and the ability to make decisions to shape one’s own future. BEoM projects support local associations and works closely with them. The aim is to build a civil society that contributes to the formation of opinions by individuals.

During my internship in August and September 2009 in Ouagadougou, the capital of Burkina Faso, severe rainfall occurred, causing houses to collapse and destroying water pipes. It was the heaviest rainfall for 90 years. The majority of the population had never before seen such a storm. The appearance of rainfall, which differs from the normal seasonal pattern, is one of the negative consequences of climate change, according to Professor Carané of the University of Ouagadougou in a talk on environmental ecology. Precipitation becomes unpredictable in both occurrence and intensity, which threatens the existence of agriculturally based nations like Burkina Faso.

For the current climate change conference in Copenhagen, the trainees prepared a climate change exhibition. From December 2009 on, the touring exhibition is being exhibited in public institutions in selected villages near Ouagadougou. Experts as well as „normal“ villagers are invited to broaden their knowledge of climate change. The exhibition started in Latodain, a suburb of Ouagadougou. Members of the Ministry of Environment as well as local chiefs, students, childrens, adults and many other representatives of authorities and NGOs visited the successful exhibition. Among interviews with climate experts and film presentations, the NGO Zahoud’Art presents a theatre forum.

The compilation of materials for the exhibition was difficult for several reasons. For one thing, the internet, which is taken for granted as a resource in the northern hemisphere with only a few exceptions, could not be used for research purposes in Burkina Faso. Current print media in English was also seldom available. We made maximum use of the existing ‘exceptions’, which in this case was a better-equipped internet café. Aside from creating our personal “access to knowledge”, another difficulty lay in preparing the text for the exhibition.

It had to be understandable for everyone. The exhibition itself focused on basic information on climate change, its emergence and development. Secondly, the perception and importance of nature was a topic of discussion. Additionally, the impacts of climate change on a global, regional and local scale were presented. Other emphases were laid on the already established conventions and treaties, as well as the upcoming climate change conference in Copenhagen.

With the integration of European trainees in the project work, BEoM projects aim to change the European view of African countries. The project initiators dis-



Fig. 1: Soccer unites

Source: Sophie-Bo Heinkel



grees with the permanent need to help that underlines the European perspective on Africa. With regard to this, one of my internship tasks was to write daily reports about my personal impressions of the living environment and the people of Burkina Faso.

In addition to the BEoM projects, we worked with Zahoud'Art. This was an opportunity for us to be in contact with Burkinabés of our own age and therefore to be integrated into their society (Fig. 1). The members of the Association Zahoud'Art are professional actors and actresses belonging to a theatre ensemble. In their plays they choose for example, tuberculosis, AIDS or climate change

as a central theme. After their presentation they start a discussion with their audience in which solutions to problems are discussed by the audience itself. The last step of these events, called theatre forum, is to show the play once again, but integrate the new solutions in an improvisation. The ensemble is known in Ouagadougou for its theatre forum concept.

In addition to the theatre forum, Zahoud'Art organizes a summer school for children and young people. Students from Europe are invited to arrange a project for the school. We undertook this role, beginning with the creation of a four-week plan, in which the topics for our courses, their programs and our aims were fixed. With two other students, I organized two language courses in German and English. While we gained an impression of the education of young people in Burkina Faso, we also learned French. Students taking our courses were exposed to new teaching methods (Fig. 2). They had previously only had lessons where teachers stand at the front of the class and teach, but not methods like playing games and performing theatre in a foreign language. They also gained an impression of German culture.

To broaden awareness of environmental factors and how they are influenced by human beings, we set up a



Fig.2: Applying new teaching methods

Source: Sophie-Bo Heinkel

poetry competition for the young people, in which they had to emphasize the topics of water and peace. The results were presented together with the plays created in the language courses during a big event at the end of our stay in Ouagadougou.

In Ouagadougou I enjoyed many new experiences. I had previously only been exposed to the living conditions and attitudes of western countries, which are not comparable with the "African ways of life". I can't say that the ways of life are better or worse than in Europe. However, in the development of concepts concerning the guidelines for prevention of and to deal with climate change, I learned that it is essential to respect the opinion and the living environment of the local population.

Project webpage:

BEoM projects
<http://www.in-co-pa-coo.de>

Sophie-Bo Heinkel
sophie-bo.heinkel@ukb.uni-bonn.de



EUROPE

Events on Water, Health and Risk Communication:

September 2010

World Water Week: The Water Quality Challenge,
5–11 September
Stockholm, Sweden
<http://www.worldwaterweek.org/>

Risk and Management of Current and Future Storm Surges
13-17 September
Hamburg, Germany
<http://www.loicz.org/calender/Congress/index.html.en>

International Conference on Sustainable Water Management
15–17 September
Jamshoro, Pakistan
<http://www.wedc.com.pk/swm2010/>

IWA World Water Congress and Exhibition
19–24 September
Montréal, Canada
<http://www.iwa2010montreal.org/>

Climate Change 2010 - The way forward in a post-Copenhagen world
23-24 September
London, UK
<http://www.chathamhouse.org.uk/Climatechange10/-/?campaign=wbcscd>

4th European Water and Wastewater Management Conference and Exhibition
27-28 September
Leeds, UK
<http://www.aquaenviro.com/>

October 2010

12th IWA International Conference on Wetland Systems for Water Pollution Control
4–7 October
Venice, Italy
<http://www.wetland2010.org/pagine/index.php>

Water Contamination Emergencies Conference: Monitoring, Understanding, Acting
11-13 October
Muelheim an der Ruhr, Germany
<http://www.wcec4.eu>

Land Systems, Global Change and Sustainability
17-19 October
Tempe, Arizona, USA
<http://www.glp2010.org/>

Water Vent
20-21 October
Berlin, Germany
<http://www.watervent.com/english/index.php>

Climate Change and Impact Assessment
25-26 October
Aalborg, Denmark
<http://www.iaia.org/iaia-climate-symposium-denmark/>

Water and Health: Where Science Meets Policy
25-26 October
North Carolina, USA
http://www.ie.unc.edu/content/news_events/symposia/2010/

Marine Waste Water Discharge
25-29 October
Langkawi, Malaysia
<http://www.mwwd.org/>

World Toilet Summit and Expo
30 October - 3 November
Philadelphia, Pennsylvania
<http://www.worldtoilet.org/ourwork5.asp?no=1>

November 2010

IWA-WHO Water Safety Conference: Managing Drinking Water Quality for Public Health
2-4 November
Kuching, Malaysia
<http://www.iwa-watersafety2010.org/>

6th international Conference on Sewer Processes and Networks
7-10 November
Surfers Paradise, Australia
<http://www.spn6.net/>

Water Reuse and Desalination: Water Scarcity Solutions for the 21st Century
15-17 November
Sydney, Australia
<http://www.watereuse.org/>

2nd Meeting of the Parties to the Protocol on Water and Health
23-25 November
Bucharest, Romania
<http://www.euro.who.int/en/what-we-do/health-topics/environmental-health/water-and-sanitation/protocol-on-water-and-health/protocol-bodies/meetings-of-the-parties>

December 2010

The Global Catchment Initiative
06-08 December
Bonn, Germany
<http://www.gwsp.org>

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WHO Collaborating Centre for Health Promoting Water Management and Risk Communication
IHPH - Institute for Hygiene and Public Health
University of Bonn
Sigmund-Freud-Str. 25
53105 Bonn, Germany
phone: +49 (0)228 - 287 19515
fax: +49 (0)228 - 287 19516

Editors: Dr. Andrea Rechenburg, Prof. Dr. Thomas Kistemann, Prof. Dr. Martin Exner

English copy editor:

Helen Hanimann-Robinson, Forch, CH

Layout:

Christian Timm

Contact:

whocc@ukb.uni-bonn.de

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