Over Troubled Water

Water as a precondition for development

Global Education programme manual from
The World in the Shopping Cart series

NAZEMI

world in the shopping cart

The World in the Shopping Cart

- The purpose of the global development education programmes titled The World in the Shopping Cart is to draw attention to the relationship between our consumer behaviour and seemingly unapproachable problems in the countries of the so-called "Global South"; that is to point out the interconnected nature of the developing and advanced countries through trade and consumption. The workshops explain selected issues (extreme poverty, poor working conditions, destruction of rainforests, etc.) to the students to give example of the products of our everyday consumption (cocoa, chocolate, coffee, cotton T-shirt or jeans, Coke, and others).
- The workshops also try to present more responsible, greener, and people-friendlier consumer alternatives such as Fair Trade, FSC (wood certification) and organic products.
- One of the principal objectives of the programme is to stimulate students to ponder over problems and their context, to critically evaluate the presented information and formulate their own opinions and attitudes.
- The educational series World in a Shopping Cart forms part of a homonymous campaign for responsible consumption.

Other workshops from the programme "The World in the Shopping Cart":

- **Coffee Way Too Strong.** Coffee and (un)fair trade
- **Bitter taste of chocolate.** Cocoa and child labour
- **Clothes Makes the Man... and Who Makes the Clothes?** Cotton and working conditions in the garment industry
- **The Taste of a Rainforest.** Causes and impacts of rainforest felling
- **Coca-colonization.** On multinationals (not only) in developing countries
- **Banana Spots.** How the tropical farmers lives with pesticides
- **Over Troubled Water.** Water as a precondition of a development

Over Troubled Water.
Water as a condition of a development
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Content

Instructions For Use

Dear teachers,
The task of this manual is to introduce to you one of the workshops of our cycle 'The World in your Shopping Cart.' The workshops advocate active teaching methods. They are made up of several connected activities, arranged to accommodate the three-phase E-R-R teaching model (evocation – realisation of what the information means – reflection). Basically, the workshops are built around group work (social and personal skills). Through hands-on activities, they ensure that learning is anchored in experience. There is also some work with texts (teaching and problem-solving skills). Discussion and attitude-related activities will develop citizenship and communication skills. Above all, the programme corresponds to cross sectional topics Education and Thought in a European and Global Context, and Environmental Education.
The workshops serve as a good introduction to these areas. The topics treated are very complex, and can therefore be expanded with their own activities.
The purpose of this manual is to provide a detailed methodology for holding one workshop from the cycle 'The World in the Shopping Cart,' and to support the methodology with information that will allow the teacher to spend as little of his or her own time as possible preparing the workshop.

Methodology
In the presentation of the methodology we have mentioned the objectives fulfilled by the workshop and its activities. Partial objectives then show up in concrete activities, as do lists of teaching aids.

Minimum two hours
The workshops are conceived for a minimum of two teaching hours, but it would be even better to extend the program and dedicate further time, especially to discussion. This is particularly attractive and useful to older students, because in addition to working on important communication skills, they have the opportunity – in the context of confrontation with others – to refine their own opinions and attitudes. The suggested schedule comes from the experience of teachers who have held the workshops numerous times. Nevertheless, the teachers who have tried the workshops for us led them in widely differing allotments of time (e.g. 1 × 2, 2 × 1, 2 × 2, 1 × 3teaching hours). So in addition to being possible within normal teaching hours, the workshops are well suited to special activity days at school.

Appendices
In the methodological part of the manual we have presented a complete list of teaching aids. The majority of them will also be found in the part entitled 'Appendices.'

- *The resources marked with an asterisk (photos, pictures, recordings) can be found in electronic form on our website: www.svetvnakupnimkosiku.cz/skoly/materialy. To make sure that the individual building blocks of the workshop mesh together, we have visually differentiated the information in the text.
- Important contributions from the teacher, which sum up what should stand out in the course of an activity.
- The windows for 'Transition to the next activity' facilitate the fluent progress of the workshop.

Documentation has been structured in three kinds of text field: the main text on a coloured background is supplemented by the text frames, which give illustrative examples or relevant details. The bullet points in the margin are designed to orient you in the main text by summarising the basic message of the corresponding section of text. The bullet points allow a quick reading of the text when you are repeating the workshop, and you can add to them yourself.
We hope that these materials will be a dependable guide to some aspects of our globalised world, and that they will inspire you to further develop these topics with your students. We invite you to send suggestions for improvement, as well as additions and information for the activities, to this address: vzdelavani@nazemi.cz.

WHO IS BEHIND WATER?

WATER AS A CONDITION OF DEVELOPMENT

Objectives of the workshop:

Knowledge:

- Students identify activities in which they routinely consume water.
- Students get to understand some of the causes and consequences of safe drinking water scarcity in different parts of the world.
- Based on what they know so far, students deduce which countries or parts of the world suffer from water scarcity.
- Students compare a map illustrating a physical and economic water scarcity and based on the comparison they draw conclusions.
- Students find relations between our behaviour and water problems in the world and discuss them.

Skills:

- Students in groups find out what their average water consumption is.
- Students imagine the living conditions of people in developing countries suffering from the water shortage.
- Students discuss the consequences of safe drinking water scarcity.
- Students find key information in the text.
- Each group of students makes an informational poster.

Attitudes:

- Students realize water is a shared source and as such it also means a shared responsibility.
- Students suggest potential solutions or measures concerning global water crises.

Group size: 15–30 pupils / students

Duration: 100 minutes and more (2 teaching hours together including a break, 3 teaching hours or even longer depending on students' needs and interest)

Place: Classroom or a schoolroom with free space

Resources:

- a flipchart or a blackboard
- markers or chalks
- blue pieces of paper (depending on the number of students), possibly pieces of cloth, cardboard etc.
- tables to write down daily water consumption (*Appendices Act. 2*)
- cards with a description of things/ activities involving the use of water (*Appendices Act. 3*)
- glass beads or other small objects (e.g. beans) representing litres
- a political wall map of the world
- post-its (in two distinct colours)
- a data projector, a computer
- a video clip*
- sets of printed photographs for relevant case studies*
- case studies – one case study in more copies for everyone in a group (*Appendices Act. 5*)
- large sheets of paper (depending on the number of groups), markers, pencils, scissors, glue
- sets of questions relating to case studies *(Appendices Act. 6*)
- maps* (physical vs. economic water scarcity) in electronic form
- leaflets summarising information on the workshop's topic (*Appendix Summary for students*)

*

The resources marked with an asterisk (photos, pictures, recordings) can be found in electronic form on our website: www.svetvnakupnimkosiku.cz/skoly/materialy

Name of Activity	Type of Activity	Objective/Information	Duration
1. Water on Earth	Introductory, warm-up	Making contact with students, introduction to the topic	10 min
2. My consumption	Small group work, comparing results	Estimating one's own water consumption, comparing results, average water consumption in CR	15 min
3. If there's not enough water	Group work, experience, discussion	Taking a closer look at issues relating to water scarcity in developing countries, the necessity to choose between various needs	15 min
4. Hard reality	Video extract, working with a map	Taking a closer look at developing countries, the spread of water problems in the world	5-10 min
5. Case studies	Group work with text and photos, poster making	Different kinds of water problems in the world, their causes and consequences	15-20 min
6. Questions and answers	Searching for specific information on the posters, sharing	Different kinds of waters problem in the world, their causes and consequences	15-20 min
7. Conclusion	Collective work with maps	The difference between physical water scarcity on the ground and insufficient access to water, water as a shared source and shared responsibility	10-15 min

Abbreviated version:

If time is short to do all the workshop activities, you may shorten some parts or leave out some activities entirely. For example, you can leave out the video clip, which is more illustrative and less essential as regards the link between activities. When you come to the activity Questions and Answers, you can decide about how deep you want to go in discussing specific cases and, in particular whether you will let students work with one or more posters.

The workshop may be divided into two or more shorter blocks. For example, you can interrupt your work after activity 4 and go on with case studies in the next lesson. Students can create posters or prepare presentations as their homework.

Extension:

There are many ways of extending the workshop in the form of other activities. **Case studies** can be treated in groups to make presentations using photos; students can search for more information on the internet or look for similar cases. You can spend more time on presentations and focus more on students' presentation skills (see tips in Activity 5). Poster making can be an art activity and you can display the posters in the classroom and come back to them later. Individual case studies deal with quite complex issues that can be elaborated in a broader way. You can easily spend an entire lesson on each case; some cases are in fact similar and when comparing them students can derive sides, causes and consequences of conflicts described.

The topic of our **direct water consumption and discipline** is addressed only marginally as the workshop's main focus is somewhat different. The workshop presents water as an important source which cannot be taken for granted, reflecting on our consumption is therefore an important output of the workshop. You can extend the workshop also in this direction depending on your needs.

The topic of **virtual water** is very interesting as well as the relative water intensity of various products or crops. This subject can be mentioned during the second activity concerning consumption and it is developed in the case studies in particular.

With regard to water sources' availability the important issue is that of **water privatization and water management services**. More information on this and other topics can be found in the informative part of the manual.

Activity 1: Water on Earth

Duration: 10 minutes

Resources:
- blue papers (depending on the number of students), possibly pieces of clothes, cardboard, etc.

Objective:

- The teacher establishes contact with students, students get relaxed and moving.
- Students realize that without any other modification or demanding technology only a very small amount of water on the earth can be used for direct human consumption.

Procedure:

Hand out papers to students representing all the water on the Earth. The students' task is to stand on any of the papers but without touching the floor with their feet or any part of the body.

After that tell students that most of the water on Earth is salt water in seas and oceans which cannot be used for direct human consumption.* Take away from them about one third of the papers and ask them to rearrange them so that everybody can again stand on the papers without touching the floor. The amount of papers taken away depends inter alia on the students' abilities and relationships within the group.

Go on in a similar way. This time tell the students you have to take some more papers away as a part of fresh water is contained in glaciers. Finally, you can take away papers representing water resources hidden deeply underground. At this stage, take away only a small amount of papers depending on the situation.

It will be increasingly harder for students to find a space on papers. You can comment on the situation.

After the last stage of taking papers away, wait till all students stand on papers and nobody touches the ground. No matter if they succeed or not, end up the activity and sit down in a circle again. Talk for a while on what this activity was about and what it was supposed to illustrate. Encourage students to guess what part of the total water amount on Earth can be used for direct human consumption (little less than 1%). Together revise in what form water on Earth exists (seas and oceans, glaciers, underground water).

Important outputs:
Students now know that despite there being huge amounts of water on Earth not all of it can be easily accessed and used by man. Such water in fact accounts for less than 1% of the total volume.

Tips for leading the activity

In a group with good relations and a friendly atmosphere this activity is very popular and it is usually a source of entertainment and relaxation. But if the students don't know each other well and you have a reason to believe that close contact would be unpleasant for them, then consider using another introductory activity instead.

As there is less and less space for students, pay attention to their safety (table and bench corners, chairs standing around). You may want to observe the cooperation between the students as well.

Transition to the next activity:
Tell students that in the workshop you will address only the kind of water which can be used by humans directly and with which we have to make do and manage it well. First of all we are going to deal with our own ways of water management: think about how much water we need and what do we use it for.

*or can be possibly used after desalination, i.e. very expensive and technically demanding process

Duration: 15 minutes

Resources:

- tables to fill in daily water consumption (*Appendices Act. 2*)
- blackboard and chalks or markers
- pencils

Activity 2: My consumption

Objectives:

- Students name activities in which they routinely consume water.
- Students estimate how many litres of water they use a day.
- Students in groups count their average water consumption.

Procedure:

To begin with, ask students what they routinely use water for. Encourage them to give a few examples. Their task in the following activity is to create a list of activities for which they use water daily; then they have to guess how many litres of water they use for each activity and based on these estimates they have to count and get their own water consumption per day.

Taking a bath	100-200 litres
Taking a shower	30-60 litres
Flushing the toilet	3-30 litres
Washing dishes in a dishwasher	7-20 litres
Doing laundry	30-90 litres

Hand out tables in which students write down areas of water consumption and their estimates. You can let students work individually or in pairs. In the left column students write down areas of consumption (e.g. drinking, cooking, washing hands) and in the right column an estimate of the water amount which they need to do this activity (in litres). Finally, they add up figures in the right column. The total represents their water consumption per day (an estimate).

After all students have put down their estimates, make up groups of 4-5 members. Ask the students to make an average of all individual estimates. Make sure groups know what a mathematical average is and how to calculate. Explain to students that an average value is in similar cases more exact than mere individual estimates.

On the blackboard write the groups' average numbers. After you put down all the results, tell students what the real consumption is per person and per day in the Czech Republic (about 90 litres). You can count the total average of all group estimates and compare them to a real figure.

Ask students which areas of water consumption they included and write their ideas on the blackboard. In this way, you get a list probably including areas such as drinking, cooking, washing, laundry etc. You can add some more information on how much water is needed in each of these areas.

In addition, talk about the fact that not all the people on Earth have the same amount of water available as we have here, in the Czech Republic. Where is this true and where not? Who probably consumes even more water and who consumes much less?

Tell the students that the issue of water needed per person is dealt with also by some international organizations. According to them, a minimal amount necessary to meet basic human needs amounts to 20-50 litres a day. You can point out that with this amount of water it can be very difficult or even impossible to meet needs in all the areas written on the blackboard. What can this mean to people who are forced to get along with this minimum or have even less water at their disposal?

Important outputs:
We use water on a daily basis for activities necessary to stay alive and healthy. Water is necessary to meet basic human needs.

Tips for leading the activity:

Students fill in the tables with data concerning their own water consumption, while the teacher walks around, encourages students to work, asks them if they understand their task etc. Many students may take this opportunity to ask about some of information, e.g. bath or flush tank volume. It is up to you whether you give them this information or rather encourage them to guess the volumes.

To illustrate the consumed water volume especially to younger students, you can use a middle size pot of approximately 5 litres in volume or a two-litre PET bottle. Students can then imagine how many of these pots or PET bottles are needed to fill a bath or to other activities.

Using average figures in smaller groups is useful especially as you won't get any atypical figures on the blackboard – no too low or too high values – and the figures will probably reflect reality. If you want to save time, you can ask students to fill in tables in pairs or small groups and to write down all the results. Or you can put down only those figures from students who give them to you on request.

If you wish to mention the topic of virtual water during this activity, ask students what else they consume water for – including indirectly. What things used daily contain water? Where does this water come from?

Transition to the next activity:
Tell students that the next activity will explain in more detail what restrictions can safe potable water scarcity bring to people's lives. This way they will have a chance to see what problems people face in countries where a sufficiency of water isn't taken for granted.

Activity 3: If there's not enough water

Duration: 15 minutes

Resources:
- cards with names of activities for which we need to use water (*Appendices Act. 3*)
- glass beads or other small objects (e.g. beans) representing litres

Objectives:

- Students realize which activities we use water for and how important these activities are.
- Students imagine the living conditions of people in developing countries suffering from water scarcity.
- Students discuss the consequences of a safe potable water scarcity.

Procedure:

Divide students into groups of 3-6; the groups can stay the same as in the previous activity. Each group will represent a family that has to get along with an allocated amount of water.

Number of litres available (per person per day)	
Mozambique	10
Ethiopia	20
Nigeria	40
Bangladesh	50
Czech Republic	90

Areas of water consumption
Taking a bath, shower
Toilet
Washing hands
Doing laundry
Washing up
Cooking
Drinking
Housecleaning (e.g. floor mopping)
Water for cattle
Watering / irrigating food crops
Watering / irrigating cash crops
Rinsing food (e.g. fruit and vegetables)
Entertainment (games, refreshment)
Car, bike or motorbike washing

Give each group a set of cards with activities for which they need water. Apart from that, give students also an adequate number of small objects (e.g. glass beads, small leaves, beans, etc.) representing litres of water available per family member. The amount of water available per person per day will differ among groups depending on the country a family lives in. But don't tell that to students yet.

Each group's task is to divide allocated litres between areas of consumption described on the cards in order to cover their basic needs. They decide – on their own – in which area they will limit their consumption or which area they will leave out completely. Agree on a time limit (5-10 minutes).

After that ask the groups to tell others the number of litres available to them and briefly describe the way they divided the allocated water between different areas of consumption. Ask the students whether it was a hard decision and why. In what cases? In what ways did they have to limit their needs? How did they decide? What came to their mind during the activity? What would be the consequences of their decisions in real life? (e.g. diseases, hunger, etc.)

You can jointly write down the consequences on the blackboard. What can be the causes of water scarcity? (natural conditions, economic situation, climate change, etc.)

Finally, ask students about their guesses concerning the countries each family comes from. What is the difference between water consumption (and need) in developing and developed countries?

Important outputs:

- Not only thirst but also impaired health, the spread ofdisease, hunger and malnutrition, worse school attendance, poverty and so on rank among the consequences of clean water shortage (for more detailed information see materials to this workshop).
- Developing countries are to a large extent dependent on agriculture, most of their inhabitants are directly dependent on what they produce themselves. A lack of water often jeopardises the lives of people who lose their source of subsistence (cattle, food or cash crops).

Tips for leading the activity:

If you allocate individual groups a different number of litres as mentioned above, students will better realize uneven distribution of water sources and 'injustice' in access to water. However, you may choose another option of giving all students the same amount of litres –for example 20. Groups will then be able to compare their decisions and discuss together what made them decide in this or that way and their ways of thinking.

Transition to the next activity:
Ask students whether they think the amount of water available to them as a family living in a developing country reflects reality. Tell them you are now going to take a look at such a situation specifically.

Activity 4: Hard reality

Duration: 5–10 minutes

Resources:
- a video extract*
- a data projector, computer
- a wall map (political)
- small post-its (distinctive colours)

Objectives:

- Students learn about the reality of life in developing countries through a specific case.
- Based on what they know so far, students derive which states or parts of the world suffer from water scarcity.

Procedure:

Students watch a short video clip concerning water problems in an African community. Repeat that it is only one specific example of what a water shortage can look like. Ask students about the clip they saw: what caught their attention or what was a surprise to them, what they noticed.

Then ask students to use post-its and mark on the map places they think have problems with water. In what places can people have problems to reach the above mentioned minimum needed for life? Let students justify their guesses. If necessary you can comment on the distribution of post-its on the map or possibly add some.

Important outputs:
- Water sources are spread out unevenly in the world.
- Water sufficiency isn't taken for granted in many parts of the world.

Tips for leading the activity:

When working with the map, let the students stick the post-its onto a map on their own. You thus give them a chance to move and revise their knowledge of geography. In case they are at a loss, the others can help them with placing the post-its.

Transition to the next activity:
- Ask students whether they think water problems concern only poor (developing) countries. Why yes and why not? If they didn't come across this issue when placing the post-its, encourage students to think about water problems in some economically developed countries. Do they have any? Do students know about any problems with water in the Czech Republic?
- Tell students they are together going to deal with special cases from areas marked on the map and some other ones where people face water problems for different reasons.

Duration: 15–20 minutes

Resources:

- sets of printed photographs concerning specific case studies*
- case studies in copies – one case study in more copies for each group so that everybody can read it (*Appendices Act. 5*)
- large sheets of paper (depending on the number of groups), markers, crayons, scissors, glue

Activity 5: Case studies

Objectives:

- Students find important information in the text.
- Students create an informative poster in each group.
- Students understand water problems in different parts of the world.

Procedure:

Divide students into groups of 3-6 (5 groups maximum), or they can remain in the same groups as in previous activities.

Tell students each group will get a text describing a real water problem in some part of the world. In addition, they will receive photographs to illustrate the story.

Each group's task is to create a poster based on the information in the texts, using photographs, their own sketches and notes. The poster should inform about the nature of water problem in such a way so as to be comprehensible also to those who will not read the text. Emphasize that they will use posters in other activities as well so it is necessary for them to be clear and contain all information important to understanding the problem.

Agree on a time limit (approximately 15 minutes). During the activity walk around, encourage students in their work, help them to understand the problem or to find the most important information in the text and use it in their poster.

After the time set for preparation expires, ask all the groups to post their posters or put them on a visible and easily accessible place in the classroom.

Important outputs:
Problems with an access to sources of quality potable water take on different forms and have very diverse causes in different parts of the world. Nevertheless, not all the problems concern real, physical water scarcity, which also means they can have some solution.

Tips for leading the activity

In the framework of the workshop this is a key activity in terms of the content and information students learn from the texts and posters. Select the groups on the basis of students' abilities so as to make sure the case studies are presented in a really comprehensible way and that you can thus use them afterwards as a basis for other work and a final reflection.

Case studies should correspond with the age and abilities of students. Some are more demanding as regards understanding, i.e. they are difficult to present them to the others.

In the workshop preparatory phase, read the texts alone in order to be able to help students when creating posters or to ask students additional questions. If you think the offered texts seem too complicated for your students, shorten or simplify them as necessary. The number of case studies used depends on the time you have as well as on the number of students.

If you have enough time, you can work only with photographs before you hand out the texts. Give each group a set of photographs and explain that these photographs illustrate an existing water problem somewhere in the world. The students' task is to take a good look at the photos and then try to guess what the nature of the water problem they depict is. Where does the story take place? Who does it concern? What is the issue in the story? How is it dealt with or was it dealt with? You can communicate the guesses and write them down on the blackboard. Only then go on in working with the texts which subsequently confirm or specify group's estimates. At the end, you may go back to the original guesses and compare them to reality.

The case study activity can, of course, be used to train students' skills in these areas: searching for essential information, expressing them comprehensibly and structuring the information on the poster. If you decide for this type of activity, the preparatory phase will take more time as well as the subsequent poster evaluation. You can set the criteria for making the poster students should follow in their work. Ask students how they worked and what was difficult for them. Encourage students from other groups to appreciate at least one thing in their classmates' work and give them at least one advice at the same time telling them in what way they can make their performance better next time. Talk about the extent in which students succeed to comprehensibly communicate the content of the story to others and which factors played a role in that. You can let students vote which poster is the best and then discuss together why they liked this particular poster most.

Students can use the case studies to prepare their own presentations. In this case let students prepare explanatory comments on photos. The photos can then be projected using a data projector while students can comment on them. This form of case study introduction is more demanding as far as students' attention is concerned comparing to poster creation – it is more demanding in the preparatory as well as presentation phase. Therefore, it is better to use it with older and motivated students.

Transition to the next activity:
The following part of our workshop is directly linked to the poster creation. Tell students that now they will have a chance to learn about the results of their classmates' work and about other case studies which individual groups used in making the posters.

Duration: 15–20 minutes

Resources:

- sets of questions concerning the case studies (*Appendices Act. 6*)
- pencils
- a wall map (political)
- post-its (outrageous colours other than in Activity 4)

Activity 6: Questions and answers

Objective:

- Students explain the nature of the water problems in different parts of the world.
- Students find and identify countries on the map and compare them to their original guesses.

Procedure:

Give out questions concerning the case studies. Depending on time available all groups can search for answers to all the questions and thus learn about all the case studies. Alternatively, each group can work with one poster only and answer only those questions relating to one case study. The students' task is to take a look at the relevant poster and based on the information they find in it answer the questions they got.

After the time limit expires, answer the questions collectively. First of all, ask those students who answered the questions on the basis of the information in the poster. Make the group who made the poster wait with the answer till the very end. You can also ask them for additional information.

Important outputs:
The same as in the previous activity: In various parts of the world, problems with access to sources of quality potable water differ in forms and causes. They aren't always caused by a real physical water scarcity.

Tips for leading the activity:

As soon as students proceed to the final phase of poster making, you can provide them with questions concerning the case study they work on. This way they can verify whether they chose essential information for their posters including information to answer their questions. If it's not the case, students can add some information in their posters so as to enable others to answer the questions.

Transition to the next activity:
The following activity with maps is again directly linked to the case study activity. Students can mark the places where the stories take place on the map and compare them to places marked in Activity 4. Ask the students whether all the problems included in the posters were related to (physical) water scarcity in the particular place.

Activity 7: Conclusion

Duration: 10–15 minutes

Resources:
- a data projector, computer
- maps* (physical vs. economic water scarcity) in electronic form

Objectives:

- Students compare the map illustrating physical and economic water scarcity and draw conclusions based on the comparison.
- Students think about causes and potential ways of dealing with water shortage problems in some parts of the world.
- Students find links between our behaviour and problems with water elsewhere and discuss them.

Procedure:

Remind students the case studies represent only a small selection of possible water problems people face in different parts of the world.

Project the map depicting global physical water shortage. The map shows areas which currently suffer from water scarcity, mostly because of natural conditions. You can compare it with the post-its placed on the map in previous activities.

After that, show students another map demonstrating economic access to water, i.e. un/availability of water to inhabitants of a relevant country or its part. Based on the definition, economic water scarcity concerns those areas where there is a sufficiency of water, but a considerable amount of people doesn't have free access to it for different reasons.

Ask students what they noticed when comparing both maps and what conclusions they can draw based on their present knowledge. Invite students to focus on some specific areas when comparing both maps. How can they explain that there is a physical lack of water in some places of Australia, but Australians don't have problems with access to water while in some parts of Latin America water is unavailable to many even though, there is a sufficient amount of it in a relevant country?

Discuss with students the link between facts shown on the maps and what they learnt from case studies.

– Was it a physical water scarcity in individual cases or rather its unavailability for some people?
– What caused it?
– What were the consequences for the local people?
– What can be done in those situations?
– How does this all relate to us?

Explain to students that globally, the problem of water scarcity, at least so far, doesn't lie in its total lack but rather in the way people use it.

Use the outputs from the work with maps and the following discussion for a final reflection. Depending on time, you can, for example, use a free writing method setting the following topic: Are water problems local? Pay attention to the causes, problems and consequences of safe potable water shortage in different parts of the world. Discuss together the links between our behaviour and problems elsewhere and look for potential solutions whether they are on a personal or international level. To sum up, you can briefly inform students about international organizations' effort to solve water problems, especially about the Millennium

Development Goals or other initiatives aiming to include the right to water amongst the basic human rights (see the information materials for the workshop).

Important outputs:

- Physical sufficiency of water in a particular area doesn't guarantee sufficient access to water for all the inhabitants.
- Water shortage for people doesn't have to be always caused by its physical lack in a given area. It often depends on the way people manage water, for what they use it and to whom and on what conditions it is provided. Moreover, physical water scarcity sometimes stems not only from natural conditions but also from insensitive human interventions in ecosystems.
- The irony is that sometimes production of crops or products which are water-intensive is concentrated in places and countries where there is not enough water (e.g. growing roses in Kenya or cotton around the Aral Sea). In this way, the mentioned countries import water in the form of goods (so-called virtual water) mostly into countries where there is enough water. Water pollution is often caused by moving the production into countries having less stiff environmental laws and by some businesses' effort to minimize production costs and thus remain competitive on the market.
- Water crises show up at the local level, but in most cases it has a global impact.
- Water is a shared source, i.e. it is our shared responsibility.

Tips for leading the activity:

Apart from the introductory collective work with the map, this isn't, in fact, an activity. In particular, the conclusion may resemble rather a lecture in some classes. Therefore, try to engage the students as much as possible, make them to take part in the discussion, ask appropriate questions, etc.

It's good to prepare what you are going to talk about. The activity is based on your presentation and in order to be persuasive you have be sure about the presented facts.

If you have enough time, you can choose a group work instead of a discussion or a lecture. Divide students into groups and ask them to draw a 'context tree' on a large sheet of paper. Its trunk will represent the water problem to which you collectively give a name (e.g. safe potable water scarcity). Its roots will be the causes and the branches will be the consequences or impacts of the problem; the leaves (or fruits) will stand for potential solutions whether on the local, national or global level. Provide each group with a sheet of paper, markers and crayons or other art aids if necessary. The way students draw the tree will depend on the time they have and other circumstances as well. Firstly, let the groups to draw a tree and then to fill their ideas into the appropriate parts. At the end, students present their works, the other have a chance to ask any questions they have.

Conclusion:

Earlier on we discussed the causes and consequences of safe potable water shortage. If you have time, focus mainly on potential solutions now. Tell the students the consequences of clean water scarcity correspond to a large extent to problems the UN wants to address through the so-called Millennium Development Goals – MDGs (see the information material for the workshop). The key to meet all the MDGs lies in the way people approach water and basic hygiene. Insufficient access to safe water and sanitation facilities could be understood as a common cause of a wide range of problems including poverty, low level of education, high child mortality or gender inequality.

Don't forget to emphasise at the end that although the water problems may seem very distant to us, we are part of them through our consumption of products made hundreds or even thousands of kilometres away. Give out a leaflet summarising the workshop to those who are interested (*Appendix: A Summary for Students*).

Water consumption

What do I use water for	How many litres a day

Water consumption

What do I use water for	How many litres a day

Water consumption

What do I use water for	How many litres a day

Water consumption

What do I use water for	How many litres a day

Taking a shower or a bath	House cleaning (e.g. floor mopping)
Toilet	Water for livestock
Washing hands or a face	Watering / irrigation of food crops
Doing laundry	Watering / irrigation of cash crops
Dishwashing	Food rinsing (e.g. fruit and vegetables)
Cooking	Entertainment (games, recreation)
Drinking	Car, bike or motorbike washing

THE ARAL SEA: HUMAN INTERVENTION IN ECOSYSTEM

Until recently, there had been no big difference between the Aral Sea and other lakes. It used to be a huge reservoir of fresh water getting its water supply through rivers, rainfall, and melted snow.

However, from the 1950s onwards the Amu Darya and Syr Darya rivers that fed the Sea started to be used as water sources for irrigating cotton fields. Vast amounts of water were being taken from both rivers. Consequently, there was not even a drop of water flowing into the Sea at the beginning of the 1980s.

Whose idea was it

After the founding of the Soviet Union in 1922 the collectivization of agriculture led to a change in economic activity. The Soviet Union focused on cotton-growing intensively and within a few years it became a major exporter of "white gold", as cotton was called. In 1956 the 1,300 km long Kara Kum canal was built diverting the Amu Darya river water to the Turkmeni desert. In terms of irrigation, cotton is a very demanding crop and when grown in monocultures (large stretches with a single crop), it needs a lot of fertilizers and pesticides in order to be protected against pests. Consequently, the Sea desiccates not only because of the river drainage but also due to the ground water pollution caused by pesticides. Consequently, the water regime changes.

What are the consequences for the Sea and the whole region

In 1960 the Aral Sea was the fourth largest lake on Earth. At the beginning of the 1990s it was almost half as small compared to its original size, and in 2007 it covered only one tenth of its original area. Due to this shrinkage the Sea gradually split into two smaller seas – Northern and Southern Aral got further divided. This development led to changes significantly affecting nature and people living around the Sea.

The reduction in water area reduction resulted in the condensation of minerals contained in the water and the Sea gradually became more saline. Increased salinity killed most of the fish and other water organisms. Fishing, the predominant way of earning one´s living, disappeared from this area.

How the changes impacted people

Sediments originally found at the bottom of the Sea are now spread by wind during sand storms afflicting local people frequently. They worsen the air quality causing various respiratory problems. Moreover, the dust is very rich in salts and minerals which when spread by a strong wind make the soil salty and less fertile even in very distant areas.

The two lively fishing towns lying on shore of the Aral Sea – Aralsk and Mujnak – became "ghost towns". In 1960 around 60,000 people earned their living from fishing in the Aral Sea. Today you can find former fishing boats in the middle of the desert and there are dozens of kilometres between them and the current shoreline of the sea.

The Quest to find a solution

After the breakup of the Soviet Union in 1991 five newly founded countries took over the responsibility for the Aral Sea problem, a step that further complicated the issue. Although the countries made an agreement on taking care of the desiccating Sea, they didn´t take any substantial steps. The Northern part of Aral located in Kazakhstan sees some hope in a dam built in 2005 leading to increased water levels and a decrease in salinity. Nevertheless, the Southern Aral continues to desiccate. Even though it is clear that the current state is unsustainable, the scope of the catastrophe, remaining poverty and dependency on export prevent any major initiative to be taken to save the Sea.

Sources:
Calder, J. (1995): "Aral Sea Loss and Cotton." *TED Case Studies*, 4(1) [online] Available at: http://www1.american.edu/TED/aral.htm.
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COPPER MINING AND THE LACK OF WATER IN NORTHERN CHILE

In order to make our mobile phones work, we need almost thirty different kinds of metal to produce them, copper being one of them. Apart from mobile phones copper is also used in the electronic components necessary for producing computers, MP3 players, and other consumer electronics. Worldwide, about one fifth of the total amount of the copper extracted is used in electronics. Chile is the biggest copper exporter producing roughly 40% of world copper. Raw material extraction and especially copper extraction is a prevailing economic activity in the northern part of Chile, in particular. In the last few years, mining has developed greatly and there are new industrial towns growing around the mines. However, a critical situation has arisen as this is an area with extremely low rainfall having virtually no surface water sources, i.e. it is an area lacking water.

Building a dam – but whom for

Los Pelambres is one of the biggest copper mines in the north of Chile. To ensure its operation the new El Mauro dam has been built. According to some local people it drains valuable water sources and there is a danger it can pollute them. The dam was built by the Antofagasta Minerals company in the upper part of a very dry valley and this project evoked controversy in the local community. While farmers pointed out the risk of pollution and the drainage of valuable sources of ground water, the ministry and mining company representatives as well as some local people argued in favour of the dam and the mine emphasizing the fact they attract new and well-paid jobs to the area.

Water is better than gold

The entire dispute provoked a national debate on how to attract investments in mining and how to preserve and protect valuable natural resources such as water at the same time. Moreover, this is only one of the many cases causing a growing concern of people in Chile over the way large corporations are destroying the environment. With regard to Los Pelambres, this is not only a local dispute. Water is becoming more and more precious in the north of Chile. Taking into account the lack of rainfall, the mines as well as the neighbouring communities depend solely on the ground water sources which are naturally limited. Mining companies are aware of the key importance of access to water and put pressure on the Chilean government to permit the pipe building bringing water down from a nearby plateau. However, environmental organization representatives insist that this step would lead to an excessive burden on existing water sources and jeopardize pastoral communities living in the area.

Who is jeopardized

Mining companies drain valuable ground water and thus limit drinking water supplies for inhabitants living in the surrounding area. That is why farmers in the dry areas of northern Chile face a critical situation. Furthermore, arsenic and carbon monoxide are released in the process of cupriferous ore smelting polluting the area as well as water sources around the mines. Thus not only workers in the mines jeopardized, so are the neighbouring farmers, fishermen and animals.

Money or water

To a large extent Chilean economics depends on natural resources such as copper, fruit and fish, all of which require huge amounts of water. This poses a problem for a country with very limited reserves. As for the Los Pelambres mine, the government and the Antofagasta Minerals company promised to ensure that the environment will not be put in danger. However, as the local environmentalists put it: it is time to decide what is more important – water or the profit from mining.

Sources:
Chambers, J. (2007): "Water clash at Chile copper mine." *BBC*, 26. 3. 2007. [online] Available at: http://news.bbc.co.uk/2/hi/business/6494509.stm.
FAO (2007): "Northern Chile: Copper and Water Supply." Modified according to Ives, J. (2001): *Highland-lowland interactive systems.* [online] Available at: http://www.fao.org/forestry/media/11714/1/0.

GROWING FLOWERS FOR EUROPE IN KENYA

A considerable amount of the roses available in European shops comes from East African Kenya. More specifically, they come from the huge greenhouses surrounding the once wild coast of Lake Naivasha, approximately 90 kilometres to the northwest from the capital of Nairobi. It is from Kenya where roughly one fourth of all cut flowers sold in Europe originate.

Local people still remember Lake Naivasha full of fish and plenty of birds, lions, antelopes, hippos and other animals living around it. However, growing large amounts of flowers for foreign markets for more than twenty years has had its impact on the environment. It is now destroyed and the lake is gradually desiccating.

Thirsty roses, thirsty people

More than thirty flower growing farms round the Naivahsa Lake put an excessive load on the lake and nearby rivers. The intensive cultivation of roses and other flowers for export has led to a decrease in the amount of lake water and to water and soil pollution caused by using artificial fertilizers and other chemicals. Moreover, the flower industry has attracted too many people in numbers which is unbearable for the local ecosystem.

Who is suffering?

Intensive flower growing causes harm not only to the lake, but also to people and animals.

Many cases of employee mistreatment have been recorded. They get low salaries, often working excessive hours, and are exposed to dangerous chemicals. Furthermore, pesticides used on the fields and in greenhouses penetrate into the lake and ground water sources jeopardising wild animals living in the area, as well as people and their livestock. Most of the land around the lake now belongs to flower farm owners and this complicates other people´s access to water. Local poor people thus have to use water from communal water taps and often wait in long queues to get it. Traditional herdsmen such as the Masai can take their herds only to a small part of the lake still accessible to public.

Surplus for those who have enough

Rose and other flower cultivation is quite water intensive. European countries buying flowers grown in Africa thus save their own water sources and import so-called "virtual" water in the form of flowers. This way they indirectly contribute to damaging the environment and to unsustainable water management on the other side of the world. Kenya, one of the driest countries in the world, thus exports water in the form of flowers to areas having sufficient amounts of water.

Roses are not to eat

The irony of the whole situation is that although Lake Naivasha represents an important water source which could enable growing a sufficient amount of foodstuff for many people, Kenya is one of the major beneficiaries of foreign food relief. Instead of fish breeding and agriculture, water from Lake Naivasha is used for growing flowers that are afterwards taken several thousand kilometres to Europe from where the food relief comes inter alia. This is done so that Europeans can buy roses, which they throw away in a few days.

Source:
Food Water Watch, Council of Canadians (2008): *Lake Naivasha: Withering under the assault of international flower vendors*. [online] Available at: http://www.canadians.org/water/documents/NaivashaReport08.pdf.

FIELDS OF SOYA FOR EXPORT

In order to get one kilogram of beef we need more than 15,000 litres of water which could otherwise be used for a direct human consumption. this is not because cattle drink so much. This amount concerns so-called "virtual" water necessary to produce 1 kg of beef from the beginning to the end.

Virtual water

A bull is usually bred for about three years on a production farm. In its entire life it drinks 24,000 litres of water and uses up 7,000 litres for cleaning. Apart from that it consumes 7,200 kg of bedding and eats 1,300 kg of cereals most of which are in the form of soya bean cake. In order to produce one kilogram of soya 1,800 litres of water are needed. One bull than gives us approximately 200 kg of meat. When professor Arjen Y. Hoekstra from the Dutch University in Twent calculated the water needed for growing feed, drinking water and care and compared it to the weight of beef, he got the above mentioned 15,000 litres of water on average per one kilogram of beef.

Czech meat

Annually, the Czech Republic imports several hundreds of thousands of kilograms of soya products. It is not about our (great) love to soya, but about our love to meat. The reason is the high demand for soya in Europe, which grew dramatically after the outbreak of mad cow disease, leading to a ban on using meat and bone meal in feed for cattle. In 2010 the Czech Republic imported 467 688 tonnes intended for feeding the cattle in the form of soya bean cake.

Soya Queen

Argentina is the third largest soya exporter in the world after Brazil and the United States. Soya accounts for more than a half of Argentina´s entire agricultural production which means that the country´s economy is to a large extent dependent on this sector. The boom in soya growing led to the development of a genetically modified variant which is very resistant. Today one needs only a spray plane and a planting machine to work large soya fields. Human work was replaced by modern machines but only big enterprises can afford them. Traditionally, soya was grown on small areas. Today, these modern machines are too expensive for small farmers so it is profitable for them to lease their land to a big company to grow soya there and not to grow anything on their own. At the same time, almost all the soya grown (98 %) is intended for export: about 30% is exported in the form of whole beans, 70 % is used to produce oil and soya bean cake for the cattle feed.

Could we live on soya?

Many people lost their jobs because of the machines that are able to work large fields. Despite the fact Argentina produces one tonne of soya per person, the local people often lack staple food. Many villagers thus move to towns and cities in the hope of a better life. What they find there is insufficient infrastructure for such a big number of new inhabitants. Recently Argentina has seen an increase in the number of expensive irrigation systems watering land with on area of one sixth of the Czech Republic. To increase the production, irrigation systems are concentrated especially in arable areas used for growing farming products. Dry areas remain without water. Although Argentina has sufficient supplies of natural water sources, 4 % of Argentinians have no access to drinking water.

70 % of water consumed in the world is used in agriculture. Nevertheless, a large part of agricultural production is intended for cattle feed and not for direct human consumption. The same applies to 90% of soya produced in the world, an example of ineffective use of soil and water.

Sources:

Water Footprint Network. [online] Available at: http://www.waterfootprint.org.

UNDP – United Nations Development Programme (2007): *Human Development Report 2007/8*. [online] Available at: http://hdrstats.undp.org.

Animal Aid. [online] Available at: https://secure.wsa.u-net.com/www.animalaid.org.uk/farming/water.htm.

Hnutí DUHA (2012): Dovoz a vývoz potravin po česku. (Import and Export of Food according to the Czechs). [online] Available at: http://www.hnutiduha.cz/sites/default/files/publikace/2012/09/dovoz_na_web.pdf.

OIL IN CONGOLESE POINTE-NOIRE

Pointe-Noire is the economic centre of Congo (sometimes called Congo-Brazzaville). Its large airport provides access to all the resorts in the area and is of fundamental importance for the country. But tourists don´t stay in the industrial city of Pointe-Noire - they change to coaches and travel to areas a hundred or more kilometres away. The reason is that Pointe-Noire is the centre of a large area affected by oil extraction.

Oil country

Oil jeopardises not only the environment, but also the health and livelihood of its citizens. In the process of extraction, waste-quality oil is often released directly to the sea. In addition, the region has suffered from a decrease of income from tourism. The area of Pointe-Noire used to be a popular resort, today its beaches are covered with tar and it is impossible to take a swim in the sea. Other consequences of oil extraction are unpleasantly hot temperatures in the city streets caused by smog from the nearby refineries.

Oil outside the windows and on dinner plates

The city lies on the sea coast and fishing provides one of the few opportunities to earn some money. Unfortunately, there is the danger of the coast becoming polluted because of oil extraction. Due to pollution the number of fish has decreased and fisherman often return empty-handed from their fishing trips. When fishing they must go much further and deeper than before, which can be dangerous for fishermen without quality equipment. If they fish close to the sea coast, they cannot eat the fish as the meat can be poisoned.

The quality of soil used for agriculture has got ten worse as well; crops don´t grow also because of the decrease in the ground water level. Last but not least, landslides to the sea can result in flooding the coastal areas with polluted water.

Fruitless effort

The main oil companies operating in the area, Agip and Elf, know about the problem caused by their activity in the area. However, they only talk about a solution and have not taken any steps to limit the impacts of oil extraction so far. The Congolese government has also turned its back on the issue and pretends it doesn´t exist, those who are responsible for it or have their share of power in fact do not pay any attention to the problem. Although oil trading yields big profit and is considered a good business in the Pointe-Noire area, in practice, local people and the environment don´t benefit from it at all.

Who should start acting?

It would help to invest part of the money coming from the sale of extracted oil to local infrastructure development and measures concerning the environment. In addition, regulations on pollution limits and handling waste oil from extraction are needed. In other places in the world it is common to apply such regulations. At the same time, the extraction, transport and use of this kind of energy have increasingly negative impact on the environment. They can influence the balance of the local ecosystem adversely or they can destroy it completely. The former and the latter both jeopardise the local community. Furthermore, other areas face similar difficulties as those in Pointe-Noire.

Source:
Esther Pabou Mbaki (2003): „Le Congo desarmé face a la pollution pétroliere." ("Congo faces oil pollution.") *VertigO – la revue électronique en sciences de l'environnement*, Regards sur le monde, 2008. [online] Available at: http://vertigo.revues.org/index4856.html.

INDUSTRIAL WATER POLLUTION IN CHINA

With its million citizens the town of Ji Shing in the Chinese province of Tiang Su is quite a small town in Chinese terms. Formerly, it was well-known for its red-brown earthenware teapots. Today, due to almost a thousand textile and chemical factories the town has seen an unprecedented boom and attracts other people from the outskirts. In particular, they are attracted by higher salaries and by the fact that they don´t have to move to distant rich regions on the Chinese coast.

Economy in the first place

However, the economic success has its other side as well. The air in the town and its surroundings smells of chemicals and most of the factory waste flows off without any treatment directly to the river at the banks of which the factories stand. The maximum penalty for polluting is about one million juans. Comparing to the cost of building a waste-treatment plant (tens of millions of juans) this is only chicken feed. Furthermore, in economic terms it pays off for the factory owners not to treat the waste water. Almost all industrial waste from Ji Shing factories then flow off untreated to Lake Tai, the third largest lake in China. The water in Lake Tai, once well-known for its beauty, dropped below the worst degree of quality on the Chinese scale. In 2007 the situation was so critical that water supplies from the lake intended for citizens of the nearby five million town of Wu Shi had to be stopped. At that time, people stood in queues to buy bottled water whose price rose from the previous 8 juans up to 48 juans per barrel.

Mr. Hong, the lonely crusader

Wu Li Hong, originally a business representative, began to take a stand against factory polluting in public. Even though the local authorities haven´t allowed him to establish an association focused on environmental problems, he decided to continue in his activities. The police warned him a few times and told him to abandon them. After more than ten years of persistent fight against pollution he was put in prison in 2007 and subsequently condemned for the alleged blackmailing of factory owners. His wife Shu Tie Hua continues in this fight. But she is under 24-hour-a-day lasting control of four observers from local police, that work in three shifts per day.

Policy influence

Mr. Hong wife believes her husband has already won his fight – the highest Chinese leaders promised to solve the problem and the local leader of the Communist party in Ji Shing committed himself to close down two thousand polluting factories by the end of 2008. The news from 2011 confirm the sceptical prospect. Only those factories have been closed which failed to profit while other new factories were built. The government has decided that instead of shutting down the polluting factories, it will focus on lake cleaning initiatives such as putting in the fish swallowing algae. Factory owners have economic power in their hands and there is no doubt they get along well with the local authorities and the government.

Why all this

Literally, China is becoming the workshop of the entire world. Shoes, toys, clothes and electronics made in China are exported to the whole world including Europe where consumers often pay ridiculously low prices for them. They are so low only because employee rights are violated so often and the environment including water is being polluted as it is the case of Lake Tai.

Sources:
Liu, Juliana (2007): "Can China make the polluter pay?" *BBC News* (18. 9. 2007).
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Lee, Ch. W. (2007): "In China, a Lake's Champion Imperils Himself." *The New York Times* (14. 10. 2007).
[online] Available at: http://www.nytimes.com/2007/10/14/world/asia/14china.html?_r=2&hp&oref=slogin&oref=slogin..
Asiaone (2011): China activist defies officials in fight to save lake.
[online] Available at: http://news.asiaone.com/News/Latest+News/Asia/Story/A1Story20111002-302743.html.

Poster guide

Mark the places where the stories from posters take place on the map:

Where is the Aral Sea and Naivasha Lake? Where can we find the town of Ji Shing?
Where is Pointe Noire located? Where is Argentina and Chile?

Aral Sea: Human intervention in the ecosystem

What was the reason to divert water from rivers flowing into the Aral Sea?

Why did the fish in the Sea died?

What are the consequences of the Sea desiccation for fishermen and other people living around it?

How is the Aral Sea case related to our lives?

What else did you find out in that poster?

Oil in Congolese Pointe-Noire

What are the roots of water problems in Pointe-Noire?

How do these problems affect the local people? Name two at least.

Who benefits from the extraction in Pointe-Noire?

How does oil extraction relate to our lives?

What else did you find out in that poster?

Industrial water pollution in China

What has Wu Li Hong, an activist from Ji Shing, taken a stand against?

How did Mr Wu Li Hong come off? Did he meet his goal?

What is the impact of the whole issue on the local people?

Is there any relation between us and the polluted environment in China?

What else did you learn from the poster?

Fields of soya for export

What is the situation of the small farmers, what problems are they facing?

What is such an amount of soya necessary for?

How does soya growing in Latin America relate to us, here in Europe?

Can you explain the term "virtual water"?

What else did you learn from the poster?

Flower growing for Europe in Kenya

What happened with the water from the Lake Naivasha?

What causes these problems?

Is the water accessible for the local people living around the lake?

Who is the final recipient of water taken from the lake?

What else did you learn from the poster?

Copper mining and the lack of water in Northern Chile

Why are water supplies for people living in the north of Chile cut?

What does the dispute over the Los Pelambres mine refer to?

Who shares the limited water sources in the north of Chile?

How do these problems in the north of Chile relate to us, here in Europe?

What else did you learn from the poster?

An access to water as a human right is inter alia supported by:

- International Covenant on Economic, Social and Cultural Rights (1966)
- Convention on the Elimination of All Forms of Discrimination against Women (1979)
- Convention on the Rights of the Child (1989)

These documents oblige states to secure an access to safe drinking water and basic sanitation to all people without exception.

Water consumption

An average Czech consumes about 90 litres of water a day (as compared to an average resident of Mozambique who has to get along with little less than 10 litres). A Czech household uses most of its water for taking a bath or a shower followed by toilet flushing

Product	Virtual water content (in litres)
a sheet of paper	10
an apple	70
a slice of bread with cheese	90
a cup of coffee	140
a glass of juice	170
a bag of chips 200g	185
a hamburger	2400

Virtual water – water through goods

It may seem that polluted water, floods or drought on the other side of the world, have no relevance to us. But don't we wear T-shirts made of cotton irrigated by huge amount of water? Don't we use computers probably made in Asia where their production contributed to a river or lake pollution? Don't we at least sometimes enjoy flowers grown in distant places, such as Kenya? Don't we from time to time have a hamburger the production of which requires 2,400 litres of water? Water is needed to produce virtually everything. You cannot tell from a product's appearance that water was used to produce it but its consumption is real. So-called virtual water is an amount of water consumed to produce one unit of a specific product.

Global good, global responsibility!

Our Earth represents one ecosystem to which no eternal source will add new water. If we imagine the entire amount of water on Earth as one big lake, then we all live on one bank of this lake. If somebody pollutes or takes out too much of it – sooner or later – people on the other side of the lake will feel it. Global water therefore requires our common care which cannot do without cooperation and joint effort of all of us. How can we tangibly contribute to this effort now? How about trying not to waste water at home, wear fewer T-shirts, have fewer computers and buy fewer roses...?

Created by NaZemi in 2012 in the framework of 'Over Troubled Water' workshop from a cycle 'The World in the Shopping Cart'. For more information see www.nazemi.cz . Supported by Ministry of Education, Youth and Physical Education and Ministry of Foreign Affairs of the Czech Republic.

Who is beyond?

Are we 'home and dry' when we can afford consuming tens of litres of water a day at the mere turn of the faucet while elsewhere people can hardly get along with a limited amount available? Who is actually beyond water and its scarcity? Large transnational corporations? International institutions? Consumers from the rich countries? Industry? Agriculture? Or somebody completely different?

Blue planet

Water covers two thirds of our planet surface. However, it is the saline water in seas and oceans that accounts for 97% of the total amount of water on Earth. When we deduct the remaining 3% of water contained in glaciers and underground water we see that out of the total volume of water in the world there is only 1% suitable for human consumption. Yet, in theory there is a sufficient amount of water on Earth for everybody – at least so far. There are some people and places that have already been suffering from its scarcity.

Who says there's a water crisis?

- 900 million of people lack access to safe drinking water.
- 2.5 billion of people have no access to basic sanitation, such as clean toilets.
- Annually, 1.825 million of children under the age of five die because of diarrheal diseases caused by dirty water and bad sanitary conditions.
- Over 30 countries face a severe water scarcity in various forms.
- Water consumption is constantly increasing as well as the number of people on Earth.

Water scarcity

Population growth and increasingly growing water consumption in industry, agriculture and households pose a bigger burden on the water cycle. Although, we haven't felt an acute drinking water shortage so far, in other parts of the world people have. Water scarcity can be either:

- **physical** (real water scarcity in a particular area), or
- **economic** (a limited access to quality water resources, even though physically there is a sufficient amount of water in the respective area).

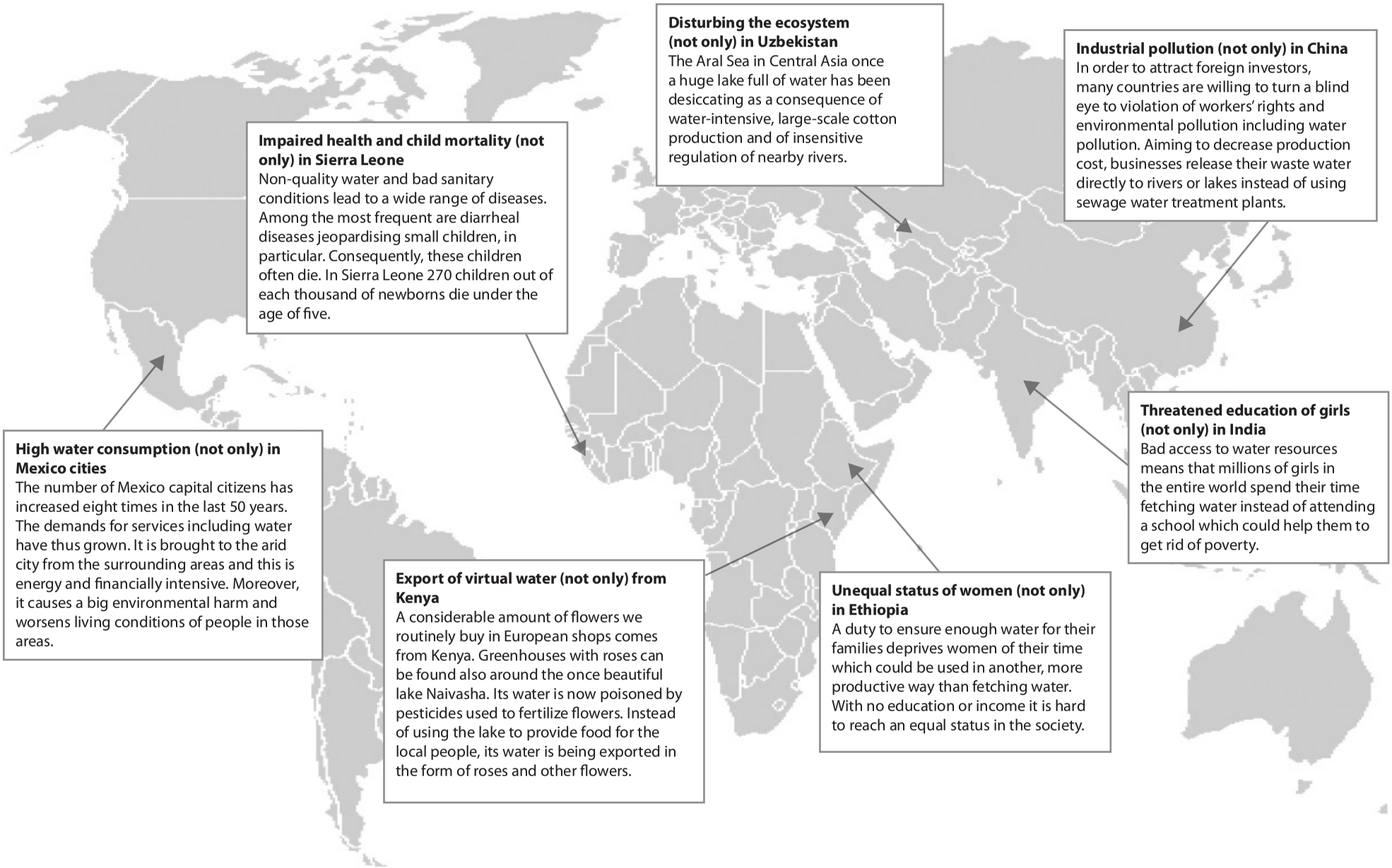
Water as a human right

Since 1980s water services have been privatised in some countries. Although, participation of private businesses can bring about some improvements, it is not always the case. It is therefore important to maintain a public control. Private businesses mainly aim to increase their profit and they don't focus on sustainability or social justice. Obviously, it is necessary to contribute financially to the operation of the water system and sewerage but the fees shouldn't be an obstacle in the access to water.

The question is whether water can be a subject of trade as well as a source of economic profit or is it one of the human rights? Who has or doesn't have to pay for water and how much?

Causes and impacts of clean water scarcity

As shown in some of the following examples, safe drinking water scarcity and related bad sanitary conditions prevent a development not only of individuals and their families but also of communities and entire states.



Disturbing the ecosystem (not only) in Uzbekistan
The Aral Sea in Central Asia once a huge lake full of water has been desiccating as a consequence of water-intensive, large-scale cotton production and of insensitive regulation of nearby rivers.

Industrial pollution (not only) in China
In order to attract foreign investors, many countries are willing to turn a blind eye to violation of workers' rights and environmental pollution including water pollution. Aiming to decrease production cost, businesses release their waste water directly to rivers or lakes instead of using sewage water treatment plants.

Impaired health and child mortality (not only) in Sierra Leone
Non-quality water and bad sanitary conditions lead to a wide range of diseases. Among the most frequent are diarrheal diseases jeopardising small children, in particular. Consequently, these children often die. In Sierra Leone 270 children out of each thousand of newborns die under the age of five.

Threatened education of girls (not only) in India
Bad access to water resources means that millions of girls in the entire world spend their time fetching water instead of attending a school which could help them to get rid of poverty.

High water consumption (not only) in Mexico cities
The number of Mexico capital citizens has increased eight times in the last 50 years. The demands for services including water have thus grown. It is brought to the arid city from the surrounding areas and this is energy and financially intensive. Moreover, it causes a big environmental harm and worsens living conditions of people in those areas.

Export of virtual water (not only) from Kenya
A considerable amount of flowers we routinely buy in European shops comes from Kenya. Greenhouses with roses can be found also around the once beautiful lake Naivasha. Its water is now poisoned by pesticides used to fertilize flowers. Instead of using the lake to provide food for the local people, its water is being exported in the form of roses and other flowers.

Unequal status of women (not only) in Ethiopia
A duty to ensure enough water for their families deprives women of their time which could be used in another, more productive way than fetching water. With no education or income it is hard to reach an equal status in the society.

Who is behind water?

Water as a condition of development

When looked down from space, the Earth is almost entirely blue. It's so blue people call it the Blue planet. Three thirds of it are covered with water, so it may seem there is a sufficiency of water for everybody. Is this really the case?

Most of the water on Earth is saline water in the world´s oceans unfit for direct human consumption and for all other organisms except for marine plants and animals. To be precise, it is unfit unless we have expensive and energy intensive technology. Out of the total amount quater fresh water volume is relatively small. Although sources provide different figures, water accounts for roughly 1-3% of the total water volume on Earth. Part of it takes the form of glaciers so the amount of freshwater fit for drinking, irrigation and industry is even smaller than the remaining 1%. In spite of this, it is a huge amount of water which could be – at least in theory – enough for all people currently living on Earth

Saline water in the world's oceans accounts for more than 97% of the total water amount on Earth. After deducting a certain amount of fresh water which is inaccessible for direct human consumption, we come down to less than 1%. If managed properly, this amount should be sufficient for all people currently living on Earth.

So is there enough water for all people on Earth? Will there be enough water in a few decades if we take into an account current global population growth? What are the presumptions leading to catastrophic forecasts concerning water shortage? Or: Why do thousands of people suffer from safe water scarcity even in areas where water is physically sufficient for everybody? What is the life of people who walk for water several kilometres a day like? What are the consequences of water scarcity for people and whole communities? Who does water belong to? How does it relate to the development of poor areas in the world?

According to experts, the problem is not so much physical water scarcity in the world, but rather the way in which water is spread, managed and distributed. There are areas which as a result of climate change and other processes caused by human activity suffer from drought more often than they did before. There are people, mainly poor people with a small amount of financial means and low political impact who are systematically excluded from an access to safe drinking water. The environmental issue of water shortage turns to be a political, social and moral issue as well.

The Earth is an integrated ecosystem from which no substances including water can fade away out of the blue. All water in the world could be compared to one lake around which different people live. The amount of water in the lake stays the same and the people living around it have to take care of water in such a way so as to prevent its needless decrease as well as to keep it clean for themselves and others.

David Suzuki, a Canadian environmentalist, used a lake example to explain exponential environmental damage. In Suzuki's example there is one water lily in the lake on day 1. It exponentially reproduces and on day 60 water lilies cover the entire surface of the lake which dies because of oxygen shortage. The question is how does the lake look like on day 59? The answer is that it's half covered with water lilies and

Environmental problems don't grow up linearly but exponentially. Therefore, it is difficult to estimate the real scope of changes and damage impacts.

We are linked to places suffering from clean water scarcity that are thousands of kilometres away through global climate change but also through international flows of goods.

According to UN, today's world faces 'global, energetic, food and climate crisis and none of these crises can be dealt with effectively without knowing and taking into an account their relation to water.'[1]

everything seems OK. Nevertheless, it will be destroyed the very next day. According to Suzuki, environmental problems don't grow linearly but exponentially, individual harmful effects don't simply add but multiply. It means that ecosystems can be endangered in thousands of ways that are hard to observe. In addition, it is difficult to estimate the consequences of their joint effects. According to Maude Barlow, a well-known author and an activist fighting for the right to water, our planet currently founds itself on the day 59 as regards the state of its water resources (Barlow, Clarke 2005:27).

Quite frequently there are news in the media from different parts of the world informing about catastrophic droughts and subsequent poor harvests or, to the contrary, on floods destroying harvests, houses and people's lives. We know the pictures of polluted seas and waterways, spreading deserts and melting glaciers. Although they often appear quite isolated having only local consequences, water problems are of a global nature and context. Even if they don't concern us directly, we are a part of them through global processes such as **climate changes** which we take part in, or **flows of goods** we buy and to the production of which water was needed. The unreasonable management of available water resources can make clean water scarcity in many areas real; more real than we think.

The following background material for the workshop 'Who is behind water?' deals with the issues of water need and consumption, sustainability of the current system of water care, water distribution control and questions concerning a human right for an access to water. This way it tries to answer some of the above mentioned questions. First of all, it pays attention to state of the water in the world and its consumption in households, industry and agriculture. It explains the concept of virtual water and its use. It addresses the consequences of safe drinking water scarcity, conflicts over water as well as questions and problems related to water resource privatization. The workshop 'Who is behind water?' shows what can water problems look like in specific cases taking place in different parts of the world. This text should serve as a source for other information and help to understand the causes and consequences of individual events.

Did you know that:

- an average Czech routinely consumes 90 to 100 litres a day and an average American even more than 500 litres a day?
- every day 10-20 thousand children die of diseases as a result of clean water scarcity?
- more than a billion people in the world don't have an access to a quality source of drinking water?
- 1.2 million people in China had to move because of the construction of the world's biggest dam Three Gorges?
- in order to produce 1 litre of packaged water 2-3 litres of water are needed?
- to produce a hamburger 2,400 litres of water are needed?
- toilet flushes in the Czech Republic use drinking water?
- 75% of the human brain is made of water?
- out of the total amount of water consumed, approximately 10% is used in households, 20% in industry and 70% in agriculture?
- every day two million of tonnes of waste are released to water resources across the world?

Water in the world

Currently the water cycle as a whole faces escalated pressure. Many activists and experts warn that today's methods of water management, world population growth and constantly increasing water consumption will simply result in clean water elimination.

If we consider water a renewable source, we tend to believe that there is an unlimited amount of water in the world. But the amount of fresh water is naturally limited and it doesn't change or the course of time. Moreover, not only is there constantly the same amount of water on Earth but the water that is available to us today and which we so often use excessively, salinize and pollute, is the same water that has been on Earth since the very beginning. As regards water resources, it is highly probable that we won't find any new sources as was the case of oil or natural gas. The name of an exhibition in the Irvine Museum in California, put it well: 'All the water that will ever be, is, right now.'

Our Earth is not covered with water evenly. In addition, human activity has an impact on the appearance and quality of water resources. People, unlike other animals, use water not only to meet their primary needs such as drinking, cooking, sanitation or crop growing for living but use waterways and water resources to meet other needs, for example, for energy production or storing waste. In some cases however, human activity can have such an impact on ecosystems so as to gradually change their ways of working. Water becomes unfit for use as a consequence of climate changes, desertification and other processes.

The fresh amount of water on Earth is limited and finite. It's the same water that has been on Earth at the time of its formation.

22 March – World Water Day

People use water not only to meet their own basic needs. Human activity changes the quality as well as occurrence of water resources.

Water scarcity

Water scarcity is a concept determined both by the availability of water and by consumption patterns. In other words, we can talk about water scarcity from the perspective of the existent and potential water reserve in a particular area or as regards the current and future need of water. At the same time, water consumption and availability is influenced by a large number of factors so a relative in/sufficiency of water varies widely from country to country, and from region to region within a country.[2]

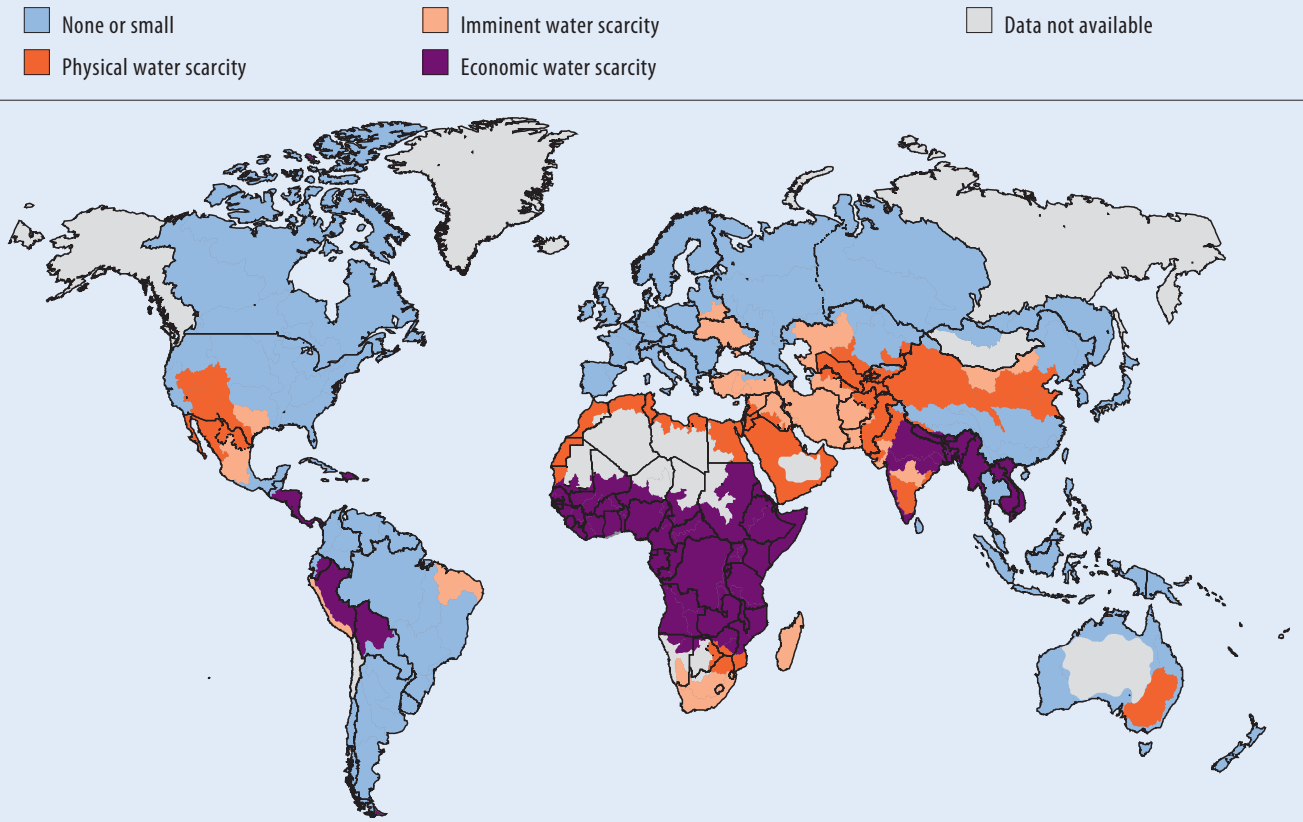
The map bellow shows areas in the world where people suffer from water scarcity. It illustrates both physical and the so-called economic water scarcity. These terms differ from each other in a fundamental way:

- **Physical water scarcity** appears when the demand exceeds the landscape's ability to provide a required amount of water. Most of the dry areas in the world are characterised by this water scarcity. Nevertheless, there is a growing number of areas where a physical water scarcity has been caused by human activities (e.g. Colorado River basin, the US).

We distinguish physical water scarcity when there is a higher need for water in a particular place than its reserve in the landscape, and an economic water scarcity when some inhabitants have a limited access to a quality water source, even though there is enough water.

- **Economic water scarcity** means that a certain part of the population doesn't have sufficient financial means needed to use an existing water source. In fact, this concerns an unequal source distribution for various reasons including political ones (e.g. Sub-Saharan Africa).

A map | Physical and economic water scarcity in the world



Source: Modified according to Comprehensive Assessment of Water Management in Agriculture 2007

Deserts or other types of very dry ecosystems often rank among the areas threatened by physical water scarcity. What is interesting on the map in the first place are the dark areas identified as economic water scarcity areas. The central part of Africa is the largest in this respect –it is an area covered by many rain forests. The irony is that right here, despite the rain forests, large lakes and regular rainfall, water is not available to all inhabitants. On the contrary, a majority of people living on the western coast of the US or in southeast Australia don't suffer from acute water scarcity as regards meeting their common needs, although these are areas threatened by physical water scarcity as it is clear from the map.

According to the UN Report on Millennium Development Goals 2008:

- 1.2 billion people in the world suffer from physical water scarcity
- an other 1.6 billion people live in areas of economic water scarcity

(OSN 2008: 40)

Economic water scarcity poses a fundamental problem as well as a key challenge for the global community. It means that despite physical water sufficiency in nature in a particular area an access of people to water is limited for various reasons. For example, too high and fast population growth, climate change impact, unsuitable land use, political circumstances including international disputes, pollution, inadequate legislation, water source management or competition between sectors and water use in industry rank among these reasons. In such cases the issue is not a random, uneven spread of water sources but it is a consequence of human activity for which somebody bears responsibility. Another frequent reason can be a systematic disadvantaging of particular groups in population who don't have the means to or simply cannot defend themselves against the interests of governments or transnational companies. Despite, or rather because of, that people in the whole world have to ensure an access to a sufficient amount of water in a proper quality for all without exception.

For the above mentioned reasons the case studies used in the 'Who is behind water?' workshop mainly deal with economic water scarcity caused by export oriented agriculture and industry. The Aral Sea and Naivasha Lake in Kenya illustrate that even the people living on the banks of large lakes cannot take the sufficiency of quality drinking water for granted. Another example of copper mining in Northern Chile shows that even the dry areas are often used in water intensive industries disregarding the consequences for local people and ecosystems.

The cause of economic water scarcity is its unjust distribution which can be changed through human effort.

Water Consumption

In connection with imminent water scarcity in the near future a **population growth** is frequently mentioned as an increasing burden for a water cycle. According to Barlow and Clark (2005), population in the five areas most threatened by disputes over water resources (the Aral Sea area, basins of the rivers of Ganges, Jordan, Nile, Euphrates and Tigris) is expected to grow by 45-75%. At that time there will be 2.6 billion more people than at the beginning of millennium and to feed them the current agriculture production will have to increase by 50% comparing to the today's state (based on the UN Food and Agriculture Organization data). Obviously, this will lead to a fundamental increase in a demand for fresh water sources. With regard to the fact – as already mentioned above – that the volume of water on Earth is limited and finite, the amount of water available per person decreases as the population grows. (Barlow, Clarke 2005:7)

Currently, two main factors contribute to an increased burden on water cycle: population growth including a growing number of people living in cities as well as an increasing water consumption – consumption growth is twice as fast as population growth.

Apart from the number of people, an age structure of population and especially the number of people living in rural and urban areas have an impact as well. Growing urbanisation rate and its unprecedented scale constitute another significant burden on water resources. Unfortunately, the developing countries and areas which currently face clean water scarcity and adequate sanitation problems will in future witness the highest population growth including urban population. (WWAP 2009:31)

Urbanisation
Besides social and health consequences of the high density of urban population, urbanisation has as important environmental context. It changes original natural landscape and creates large unbroken areas holding water such as streets, parking lots, house roofs. It thus prevents water infiltration into the soil and contributes to its fast surface drainage, i.e. to the water pollution and lowering its quality.

Water consumption is the second fundamental factor effecting current state and water resource availability. Globally, this consumption doubles roughly every 20 years and this growth is twice as fast as the population growth (Barlow, Clarke 2005). Modern technology and sanitation facilities have enabled people especially in economically developed countries to consume far higher amounts of water than they need, in fact. In cities, in particular, where the population concentration is high, water consumption exceeds the real capacity of the local sources and therefore, it has to be brought in from the surrounding areas.

Globally, water consumption in households accounts for about 10% of the total amount of water consumed. Another 20% is used in industry and the highest amount (70%) is consumed in agriculture. This proportion varies depending on a particular country.

Speaking about water consumption, we don't think only about consumption of individuals or households. Globally, households consume less than 10% of the total amount of water consumed. The remaining 90% is used in agriculture (70%) and industry (20%) (FAO 2006). Obviously, this proportion varies depending on a particular country: water consumption in poor countries where agriculture accounts for 80% of GDP is even higher while the US, for example, consume 46% in industry, i.e. more than a double of the world average (FAO 2009).

Global Water Consumption in Sectors (2010 data)

Continent/region	Total water consumption	Sector-based water consumption					
		households		industry		agriculture	
	km³/year	km³/year	%	km³/year	%	km³/year	%
world	3 862	429	11	723	19	2 710	70
Africa	215	21	10	9	4	184	86
Asia	2 456	217	9	227	9	2012	82
Sothern America	165	32	19	21	13	112	68
Central America and Caribbean	24	6	26	2	11	15	64
Northern America	603	88	15	256	43	258	43
Oceania	26	5	17	3	10	19	73
Europe	374	61	16	204	55	109	29

Source: FAO 2010.

The fact that households consume only about 10% of the total amount of water consumed may seem surprising as the water consumed in industry and agriculture is often not visible at first sight. Unlike water which literally runs through our hands at home, the amount of water contained in foodstuffs and required for producing goods we routinely buy is not so tangible. Despite that, this amount is real and important from the global perspective.

Water consumption in households

According to the UN Food and Agriculture Organization, the average global water consumption of households is 1 km3 (1 trillion litres) a day. However, the consumption in individual households can be a hundred times different. To a large extent, water consumption reflects the standard of living but the methods used in water management have also a role to play here. This can lead to a situation where two countries with a similar GDP, e.g. United Kingdom and United States of America, have very different consumption: it is 150 litres in the UK while the US consume on average 580 litres per day per person (UNDP 2006).

To a large extent, household water consumption reflects the population's standard of living. Big differences between similarly developed countries lie also in the way households manage their water consumption.

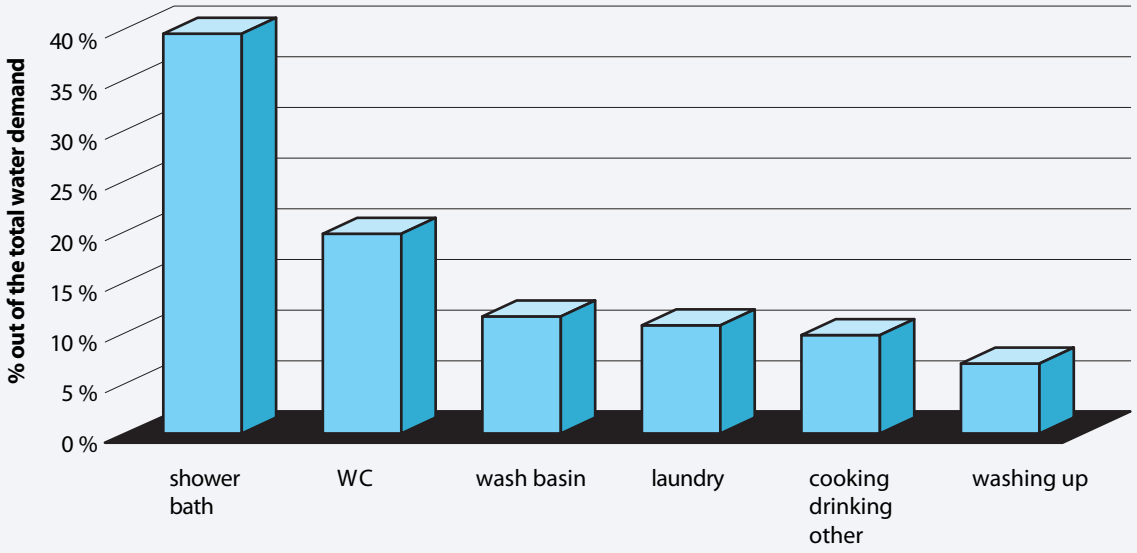
Mozambique, one of the poorest countries in the world, has an average water consumption of 10 litres per person per day, while the citizens of Phoenix, a rich desert city in Arizona, USA, consume about 1000 litres a day (UNDP 2006).

Today, the Czech daily water consumption amounts to about 90 litres per person. The figure is lower than it used to be a few years ago. According to experts, several reasons have contributed to the lowering of water consumption in Czech households: more and more people drink bottled water instead of tap water which is not included in household consumption; people use more energy-efficient appliances and last but not least the increased price of water in the 1990s contributed to it (Dušek 2008).

The daily per capita water consumption of Czech households is about 90 litres. Recently, consumption has decreased due to more energy-efficient appliances, increased price of water and drinking bottled water.

As shown in the diagram bellow, taking a bath or a shower and flushing a toilet rank among the most water-intensive activities in the Czech Republic. Other areas of consumption include: drinking and cooking, washing up, housecleaning, laundry and other activities.

Distribution of specific water demand in the Czech households (%)



Note: Diagram data stem from water consumption measurement in residential houses of the prefab type in Prague

Source: Koubková 2006

Washing

In Czech households, washing accounts for nearly half of the total daily water consumption. There are bath tubs with different capacities depending on their type: a full bath tub usually means 100 to 150 litres; a luxury corner bath tub can have a capacity of up to 200 litres. Generally, taking a shower is a saving option – different sources state different figures, but on average it is 30 to 50 litres, i.e. roughly one third of what we use when taking a bath in a bath tub (Kohoutová 2008).

Toilets

A toilet can use up to three litres in one flush (water-saving toilet) or sometimes up to 20 litres (the oldest toilet types) of drinking water. If we use the toilet five times a day, water consumption is significant. In a leaking toilet, up to 80 litres per hour go down the badly sealing refill tube, i.e. almost 2000 litres per day (Kohoutová 2008).

Drinking and cooking

Drinking and cooking represent the only way of water consumption where the need for using drinking water goes without saying. We use about 5 litres of water a day for drinking and cooking.

Approximate water consumption for various activities and in connection with selected household appliances is given in the table. Data concerning specific households can differ a lot as the consumption depends also on the type and age of appliances.

Water distribution system for households don't make water diversification for particular purposes possible. Therefore, those who use water from a central network cannot choose what water they will use and have to flush the toilets or wash their floors with drinking water. For example, flushing with rain water or water treated in treatment plants would save tens of litres of drinking water a day per each resident.

Water consumption for household activities in litres

flushing a toilet	3-10
taking a bath	100-200
taking a shower	30-60
running a dishwasher	7-20
doing a laundry	30-90
washing hands	3
car washing	200
everyday drinking	2-3
cooking / drinking	5-7

Source: Veronica Environmental Institute 2009

Virtual water – water in products

Apart from direct water consumption in households we also consume water indirectly, in the form of foodstuffs and other products. Water is contained in everything we consume; it was used to grow cotton to make the clothes we wear and to produce the petrol we use in our cars.

Virtual water refers to an amount of water used to produce a particular product (goods) in the place of production.

Virtual water (water embodied, hidden in products) in a context of trade refers to the water used in the production of a good or service. It is the amount of water used to produce a unit of a particular product (good) and it is referred to in units of volume per product unit (e.g. 1000 litres per 1 piece or 1 kg). In other words, the content of virtual water in a product refers to the real amount of water used to produce this product in the place where it was really produced (Hoekstra, Chapagain 2008).

The reason for introducing the virtual water concept was an effort to deal with – at least partly – water scarcity problem in the Middle East. The concept was first introduced by Tony Allan who was concerned with the import of foodstuff and other water-intensive products as one of the ways to effectively reduce pressure on sparse domestic water resources (Hoekstra, Chapagain 2008:3).

Virtual water has become an important **export and import article** on the global market. Countries lacking water can import water-intensive products and save domestic water sources in this way. Despite its apparent invisibility, the international trade in virtual water can become a tool for optimizing the use of water resources on Earth. But this is not always the case. Many water-intensive crops such as cotton or rice are grown mainly in the countries more to the south; the irony is that there are often areas where water is scarce. Alongside with agricultural production, these countries also export water which in a wide range of areas results in economic and – in the long-term often also – in physical water scarcity for the local people.

Water in its virtual state – in goods – has become an important export and import article which can be exploited especially by countries with physical water scarcity.

Water and food security

One of the reasons why there has been growing interest in the virtual water concept recently is the issue of food security. This is increasingly important for many countries with regard to the growing population and food price fluctuations on the world market. Food security means a country's ability to secure an access to a sufficient amount of nutritious and safe food for all its inhabitants. This aim can be reached through food self-sufficiency or a combination of domestic production and foodstuff import. For countries with severe water scarcity, e.g. the Middle East area, the import of foodstuffs can be a beneficial strategy in terms of domestic water resource management. On the other hand, most of the countries are afraid of dependency on imports in such a fundamental area as food security (World Water Council 2004).

product	Virtual water content (in litres)
A4 sheet of paper	10
a tomato	13
a potato	25
a cup of tea (250 ml)	35
a slice of bread	40
an orange	50
an apple	70
a small glass of beer (250 ml)	75
a slice of bread with cheese	90
a glass of wine (125 ml)	120
an egg	135
a cup of coffee (125 ml)	140
a glass of orange juice (200 ml)	170
a bag of chips (200 g)	185
a glass of apple juice (200 ml)	190
a glass of milk (200 ml)	200
a hamburger	2400
a cotton T-shirt	2900
a pair of leather boots	8000
a pair of jeans	11800

Source: Hoekstra, Chapagain 2008:15,119

Globally, the highest amount of water is consumed in agriculture. Alongside with water for irrigation, virtual water content in agricultural products includes water necessary to produce fertilizers and pesticides and other processing.

The calculation of virtual water content is quite complicated: in agricultural products account is taken of water-intensity in a crop in relation to the yields, attention is paid to climate conditions, loss of weight in processing, and other factors (Hoekstra, Chapagain 2008). The virtual water concept doesn't include water degraded by crop growing and during the production of goods. Degradation is most frequently the result of pollution; this concerns agriculture (artificial fertilizer and pesticide use) as well as industry (the release of non-treated water from factories to rivers or lakes).

The following table shows rough virtual water content in selected products. Given the complexity of calculations and diversity of conditions in which the referred products are made, the figures are rather approximate. Despite that, virtual water content is a significant and interesting indicator of a product's water-intensity.

Water consumption in agriculture

Water consumption in **growing** crops is evident at first sight – water is needed either in the form of rainfall or for irrigation. Apart from that water is necessary to produce fertilizers and pesticides and for other processing so for instance, to produce a kilogram of wheat 1000 litres of water are needed (World Water Council 2004). To illustrate the virtual water concept in agricultural products we are going to use a specific example of one crop: cotton. Many aspects of the 'cotton' case can be applied to other crops as well.

Cotton, following rice, is the second most water-intensive crop for its growing phase. The huge annual world-wide consumption of cotton is feasible only due to large scale cotton production with high yields. Cotton normally grows in a tropical climate but it also grows well in temperate zone with enough rainfall. As shown in the table, in many cases cotton is grown also in places lacking water (e.g. dry Greece or desert Syria). The column containing information on sufficient irrigation demands shows that in these countries cotton requires huge amounts of water.[3] In Egypt, cotton is also grown in places where there is almost no rainfall so the water demand is above-average. (Chapagain and coll. 2006)

As regards water intensity, the difference is reflected also in the virtual water amount in cotton coming from different states, as seen in the last table column. The Aral Sea case study illustrates how tragic the negative impact of crop growing in areas with unsuitable climate conditions can be (Appendix Act. 5).

The biggest cotton producers in the world and water consumption

country	cotton production (millions of t/year)	water demand to grow cotton (mm/year)	rainfall (mm/year)	irrigation demand (mm/year)	virtual water content in cotton (m^3/t))
China	13.6	718	397	320	2018
USA	9.7	516	311	205	2249
India	5.5	810	405	405	8662
Pakistan	5.2	850	182	668	4914
Uzbekistan	3.3	999	19	981	4460
Turkey	2.2	963	90	874	3100
Australia	1.8	901	322	579	2278
Brazil	1.6	606	542	65	2621
Greece	1.3	707	160	547	2338
Syria	1.0	1309	34	1275	3339
World average					**3644**

Sourcej: Chapagain et al.2006

In **livestock production** water consumption is naturally higher and the virtual water content calculation is more complicated. Water demand is higher because animal consume water not only when they are drinking and working but also indirectly in the form of virtual water contained in feed of plant origin (in the worst case in the artificial products that are even more water intensive). Therefore, virtual water is also reflected in livestock production and the higher we go in the production chain, the higher the content of virtual water is.

In livestock production water demands are higher than in crop production. Animals consume water not only directly ,but also indirectly in the form of feed of plant origin.

Virtual water in beef

On average, it takes three year for cattle to grow to sloughtering age and to get approximately 200 kg of beef (without bones). Until that time, one steer consumes about 1300 kg of wheat, 7200 kg of fibre (silage, hay...), 24 000 litres of water for drinking and 7000 litres of water needed for operation. As a result, one kilogram of beef contains 15 340 litres of virtual water.(Hoekstra, Chapagain 2008:12-13).

As we can see, our diet pattern significantly determines the amount of water consumed in food production. If all the people in the world have the same diet as the inhabitants of western, economically developed countries, world food production would require 75% more water than it uses today (Zimmer, Renault 2003, World Water Council data 2004). Naturally, with the rising living standards of people in developing countries their demands on quality food including meat will also grow and this will – together with other factors – lead to an increase in demands on water resources. A change in diet pattern thus poses one of the options of how to effectively decrease water resource demands.

The amount of water needed to produce foodstuffs depends also on diet patterns. Change in the food pattern of people in developed countries would lead to a decrease of water resource demands.

According to the UN Organization for Food and Agriculture, the daily consumption of water for drinking amounts to 2-4 litres per person. However, to produce foodstuffs per one person per day 2000-5000 litres of water are needed (FAO, date not available).

In general, the higher the position in the production chain, the higher the virtual water content. Therefore, industrial products usually have higher virtual water content than agricultural produce.

Water consumption in industry

In industry, virtual water content calculation in products is very complex as hardly any product is homogenous – industrial products are often comprised of many materials. However, based on the principle of higher virtual water content in products placed in higher positions of the product chain, industrial products usually have a higher value as far as virtual water content is concerned.

Nevertheless, this trend could be understood also in the opposite way: on the basis of previous studies' outcomes, Hillel Shival of Jerusalem University states that the recoverability of 1000 litres of virtual water contained in agricultural products in Middle Eastern countries amounts to USD 2 while for products in industry and service sectors (including tourism) it comes to USD 100-500 (Beaumont 2000, here according to Shival 2005). Such motivation is very strong for poor countries – virtual water becomes their potential source of income and it is quite high, too. At the same time, there are usually stiffer environmental laws in rich countries and it is not possible to use water in an unlimited way without any recourse. On the other hand, the introduction of more efficient technologies increases the price of the final product and the producers resist that. Both these factors contribute (alongside with many others such as a cheaper labour or more benevolent labour laws) to the transfer of production into poor countries. Industrial water pollution resulting from the production of goods for export is, for example, described in the China case study (Appendix Act. 5).

When comparing industrial and agricultural production, however, it is necessary to take into account not only water intensity but also other factors as well. Energy consumption is one of the most important ones taking the form of fuel, heat and electricity consumption. For example, cotton used for making clothes, so often criticised due to water intensity and other reasons, is replaced by artificial fibres today, most frequently by polyester. According to Gesamttextile (2001), to produce 1 kg of artificial fibres 4 litres of water are needed, while to produce 1 kg of cotton 7000 to 30 000 litres of water are used. As for cotton, the energy consumption amounts to 12-40 MJ as opposed to 35 MJ for cotton.

Water footprint

Water footprint is a relatively new concept serving to express the impact of human consumption on water resources. Traditionally, when counting water consumption of a particular country, mainly water consumed for production (agricultural and industrial) is counted. **A country's water footprint also includes water consumed in other countries, which have been used to produce goods imported to the referred country for the purpose of consumption.** To the contrary, water consumed to produce goods for export is not included in the water footprint of a given country. Apart from water amount, water footprint reflects also the content of water used to produce consumed goods through three different components: green water represents rain water use; blue water is surface and underground water; grey water is water polluted during production (Hoekstra, Chapagain 2008: 3-4).

Water for entertainment

Water is a prerequisite for all life. However, people consume water not only for activities necessary for life such as sanitation, drinking or crop growing, but often for all kinds of entertainment. Obviously, it is hard to determine which water is consumed usefully and which is wasted when talking about

a substance used to produce virtually everything. In spite of that, there are areas and activities which are clearly not necessary for people and which require huge amounts of water. Home or hotel swimming pools, golf courses, ski runs in areas without sufficient snow fall, artificial fountains or hotels located in the middle of deserts are but a few examples.

What should also be mentioned is the fashion of perfect, green, shortly-cut, mono-species **lawns** around houses. As these aren't natural monocultures, they are prone to diseases and mechanical damage in a similar way as other monocultures. Lawns need to be watered regularly, treated with pesticides from time to time and they are regularly and frequently cut. All this requires time, water, energy and money and leads to air, soil and water pollution. Chemicals from fertilizers and pesticides, often harmful to human health, infiltrate into the soil and underground water. Annually, lawn-mower engines use up billions of litres of petrol releasing large amounts of emissions into the air (Procházka 2008). Lawn and garden technology has become a big business gradually coming to the Czech Republic as well. Today, in their front lawn, people grow grass requiring constant care as oppose to former times when they used to plant flower or have a natural lawn with flowers there.

Mono-species lawns around houses or a golf courses present a burden for water resources. They require frequent watering, cutting and often chemical treatment causing soil and water pollution.

Luboš Procházka in his article Glitter and Poverty of a Perfect Lawn´says: 'It is assumed that 44% of the total amount of water consumed in Californian households has been used for lawn irrigation. In many areas once huge reservoirs of water have been almost used up. Garden technology production exploits energy, draws dry natural resources and causes pollution in the same way as the technology itself. Annually, lawn-mowers engines in the US consume more than 2,088 billion of litres of petrol. Using a motor-mower for one hour produces the same amount of pollution as to drive for 560 km.' (Procházka 2008)

Beside gardens and parks, large monoculture lawns are grown also for sport activities such as **golf**. In the Czech Republic, the case of Klánovický les is well-known – a new golf course is supposed to replace this forest area. Two unbalanced sides of the dispute clashed: citizens of Klánovice longing for nice surroundings and a strong golf lobby comprised of the richer classes of the population.

Hotels at the seaside present another questionable way of using water as in many cases they are built in very dry areas such as Croatia in Europe or other Mediterranean countries. Tourists visiting these destinations consume up to several hundreds of litres per day per person placing an extraordinary burden on the dry areas. For example in Malta, the tap water in normal people's households is desalinated sea water not having the full quality while showers in tourist hotels use freshwater imported from Italy.

Other questionable ways of using water include tourist centres in naturally dry areas.

Tourism
Tourism is typical for seasonal fluctuations reflected in – apart from the number of people heading to tourist destinations – the amount of water needed to meet their needs. For example, in the Mediterranean Sea area, one of the most popular areas in terms of tourism whatsoever, water demand increases from about 5 to 20% every year. Such demand may lead to water scarcity, mainly on the coast, on the islands or in the mountain areas. Moreover, the problem is not only the temporarily increased amount of people in the respective destination. In general, tourists consume more water than local people, they create demand for leisure activities which are often water-intensive such as golf. Tourist season often overlaps with the agricultural season when there is the least amount of water and water demands are the highest (WWAP 2009)

Bottled water
About three litres of water are needed to produce a one-litre-bottle of water. Globally, the consumption of packaged water is rising, most of it is consumed in the US: in 2005 the average American consumed almost a hundred of litres of bottled water a year. (American Museum Natural History, date not available). Mass consumption of bottled water even in areas with quality tap water is mainly the result of media advertising campaigns of large corporation supporting the consumption of packaged water.

A person needs 20-50 litres a day according to international organizations setting the minimal amount of water needed for life. Apart from the amount of water, its quality and the distance between the source and home are important.

Ensuring access to safe drinking water and basic sanitation facilities is a necessary prerequisite for development.

Today, there are small **swimming pools** outside nearly every family house in Central and Western Europe, even though there is a public swimming pool in most of the cities and towns. In the Czech Republic, every tenth family owns a swimming pool. Its average size amounts to 25,000 litres so the water consumption is huge during the season.

Bottled water consumption in the Czech Republic comes to about 875 million of litres a year, i.e. approximately 80-90 litres per person per year. To support drinking tap water, a new web page www.vodovoda.cz has been established. You can find there restaurant evaluation as regards their willingness to provide customers with tap water

If there is not enough water...[4]

Unlike the residents of economically developed countries who are in the vast majority provided with easy access to a sufficient amount of quality water, poorer part of the population in developing countries often faces severe problems with getting a sufficient amount of water to meet their basic needs.

International organizations such as UNESCO, FAO, or WHO[5] have tried **to set the minimal amount of water necessary for human life**. The purpose of this effort is evident mainly in the context of the terrifying statistics concerning the number of people and children who die or gett ill every year as a consequence of insufficient access to clean water. The amount of water needed to meet basic needs has been set of **20 to 50 litres a day** coming from a source not further than 1 km from a household. It of course depends on what we consider as basic needs. They not only refer to the amount of water we need to drink and eat in the form of food every day to survive. They also include water enabling basic personal and household sanitation and thus keeping good health in the long term. It is not enough to provide access to a sufficient amount of water, the quality of water source is important as well. It is always necessary to take into an account the particular context and conditions in the respective country or region, such as climate and season. (Abrams 2001, UNDP 2006, WWAP data non available)

Unfortunately, a wide range of countries don't meet the above mentioned recommended minimal amount of available safe water per person. As shown in the table, in some countries more than half of their inhabitants don't have access to clean water and/or to sanitation facilities. The countries in the table were selected at random, so their selection is only illustrative. Apart from that, countries from case studies used in the workshop are included in the list.

Water scarcity, physical or economic, doesn't mean thirst only. A set of consequences connected with safe drinking water scarcity for an individual, families and entire communities is very complex. Besides thirst and hunger they include diseases, malnutrition, higher child and maternal mortality, disadvantaged women and girls, conflicts, bad education and poverty. As in many other cases, especially the poor and other disadvantaged people are impacted most by the water scarcity problems.

According to the Report on Human Development 2006 addressing the global crisis of water resources and related problems of poverty, access to safe drinking water and satisfactory sanitation provides the basis for decreasing poverty, child mortality, eliminating inequality, cutting health care costs or increasing the educational level of girls. In other words, ensuring access to safe drinking water and basic sanitary facilities is a prerequisite for development.

Access to drinking water and sanitation in the selected countries (2004)

Country	% of population with access to sanitation facilities	% of population with access to quality drinking water source
Iceland	100	100
Australia	100	100
Austria	100	100
Czech Republic	98	100
Argentina	91	96
Chile	96	96
Mexico	85	96
Uzbekistan	100	87
China	64	91
Kenya	32	59
India	34	92
Congo	18	71
Ethiopia	21	44
Chad	13	51

Source: WHO 2010

Water and Health

Quality drinking water shortages and bad sanitary conditions constitute in a considerable part of the developing world a bigger danger than armed conflicts. They are also one of the reasons for the existing gap in chances of survival between children born in rich and poor countries. Out of approximately 60 million deaths that took place globally in 2004, almost 20% of cases (about 10.6 million) were children aged 5 or under. In developing countries, in particular in Sub-Saharan Africa or East Asia, under-five child mortality accounts for a third of all deaths while in developing countries this figure amounts to less than 1%. It is quality water scarcity and bad sanitary conditions in the developing world that rank among the factors contributing to this huge gap. (UNDP 2006:42)

Diarrheal disease is second only to pneumonia in causing death in small children. Annually, 1.8 million children under five die of such diseases in developing countries, by way of illustration it is 4900 children a day. Diarrheal disease usually caused by dirty water and inadequate sanitation leads to more deaths globally than tuberculosis or malaria. In addition, five times more children die of it in comparison with HIV/AIDS (UNDP 2006:42)

If we take a look at the issue from the other side, clean water and good sanitary conditions are the best way to **prevent form the infant mortality**. Moreover, investments in enhancing access and quality of water and sanitation are beneficial also from the economic point of view as they cut health care costs in the long run. Based on UNDP estimates, securing access to water and basic sanitary measures in developing countries would annually cut health care costs by USD 1.6 billion, (UNDP 2006:43).

In the developing world quality drinking water scarcity and bad sanitation result, for example, in:

- higher child mortality often caused by serious diarrheal diseases
- malnutrition and anaemia
- impaired health having a negative impact on children's physical and mental development

Although, child mortality is probably the most worrying aspect of non-quality water use in children, it is not the only one. Recurring diarrheal disease in infants can cause a severe lack of vitamins and **malnutrition**. Malnourished children are more vulnerable to other diseases leading to another loss of weight. Bad sanitary conditions and a lack of quality drinking water can cause anaemia in girls which subsequently can cause complications during child delivery (Tožička 2008).

Impaired health in children affects not only their physical and mental development, but also their school attendance. Based on the UNDP estimates, children missed 433 million lessons due to diseases related to water worldwide. By way of illustration, this figure corresponds to an entire school year of all seven-year-old children in Ethiopia (UNDP 2006:45).

Apart from the above mentioned diarrheal diseases including cholera, salmonella, intestinal dysentery and various viral infections, other diseases caused by polluted water and bad sanitary conditions are typhoid; type A, E and F jaundice, trachoma, various intestinal infections caused by worms, scabies, dengue fever, yellow fever and others. Infections caused by intestinal worms are one of the most frequent diseases in school children caused by inadequate sanitation. These parasites cause or worsen malnutrition and thus hinder physical development. Women who **carry heavy loads of water** every day for a long time suffer from permanent skeletal damage. **Cholera** poses a serious threat to countries not able to secure safe drinking water and adequate sanitary measures for their inhabitants. In 2001 the World Health Organization identified over 180 thousand cholera cases world-wide and 94% of them work in Africa (PEP 2006:36). So far we haven't managed to prevent this disease as the recent cholera epidemic has shown in Zimbabwe.

Water quality is usually not the only problem leading to various diseases – often its quantity, the amount of water available to a household, can be a problem as well. Poor water clearly and directly leads to diseases and infections. As for water quantity, it should be understood as a possibility to regularly and in a sufficient way keep basic hygiene. In places where water is rare, people often don't have enough water to meet these hygienic needs.

Lacking water in agriculture can also have an unfavourable impact on the population's health. Not only can people have hard times growing basic crops for living due to insufficient rainfall or amount of water for irrigation, but using waste water or water polluted in another way in agriculture can also have a negative impact on human health.

Trachoma is one of the examples of eye or skin infections which could be simply prevented by providing better access to water. Trachoma is an eye disease which may in case of recurrience lead to complete blindness. It is passed by eye and breath secrets but it can also be transmitted by flies. In total, there are about 6 million people in the world who have gone blind or have serious eye damage as a result of trachoma making it one of the most frequent causes of preventable blindness. Prevention may seem simple – a sufficiency of water used to frequently wash children's face and solid sanitary conditions. (PEP 2006:37)

Water, women and education

Although, it may seem at first sight that the status of women and their level of education are in no way related to water, the contrary is the case. In general, improved health in children increases school attendance. To millions of girls, better availability of water resources means that they don't have to spend their school and study time fetching water. Millions of poor families in the entire world clearly feel there is a connection between the time their children spend at school and time needed for fetching water.

Impaired health resulting from non-quality water affects school attendance in children and, therefore also their chance to break free from poverty.

In Tanzania school attendance is 12% higher in girls living at the 15-minute-distance from the nearest water source as compared to girls living at an hour or more distance from water. In the case of boys, the distance between place of residence and the water source doesn't have by far such an impact. (UNDP 2006:47).

Besides fetching water for household purposes, to girls the quality of water and sanitary facilities at school are also important, especially in the rural areas, and also to the girls at the time of their pubescence. For example, in Pakistan more than a half of girls leave school in the second or third year because there are no school toilets. On the contrary, in Noakhali region, Bangladesh, the school attendance rate in girls increased by15% after access to water and basic sanitary facilities was secured. (PEP 2006:24)

'When you ask what is necessary to ensure real gender equality, you probably don't expect to hear, toilets. Despite that we can only hardly imagine how huge the impact of providing access to private, safe and sanitary toilets would be as regards the common lives and perspectives of 1.3 billion women and girls in the whole world who have to get along without this luxury so far.' (PEP 2006:8)

Based on one estimate, fetching water in Sub-Saharan Africa takes about 40 billion hours of work a year which roughly corresponds to the number of hours all employees in France spent at work during one year. (UNDP 2006:47)

Inequalities in education related to bad access to quality water are carried forward as children become adults. Educated women can reach a better position in a community, they usually have fewer children who die less frequently and have a better chance to get educated.

In the vast majority of developing countries, fetching water is a responsibility of girls and women. The time spend fetching water is a considerable burden for them. It's no exception that women have to walk more than 10 kilometres daily in the dry season to get a sufficient amount of water for their families. The time they spent fetching water shortens the time which they could otherwise spent taking care of their children or doing other work, it decreases family income and maintains the unequal status of women in the society.

Apart from the physical burden, fetching water decreases the income of women and contributes to maintaining their unequal status in society.

Human dignity can hardly be measured or counted. In spite of that, it is an important part of development and a precondition of well-being. Insufficient access to clean, private and safe sanitary facilities makes millions of girls and women world-wide feel ashamed, it brings them physical discomfort and threatens them. To women, good hygienic

In many poor regions in the world it is especially women and girls who suffer from the unavailability of sanitary facilities.

conditions are of big importance and they are more jeopardises by clean water scarcity and bad sanitation.

Water and Development: Millennium Development Goals

Clean drinking water scarcity and bad sanitary conditions prevent community development and the improvement of economic and living conditions of people in the poor parts of the world.

If safe drinking water scarcity and bad sanitary conditions prevent education, if they jeopardise health and contribute to increased mortality, if they don't allow women to reach a better status in the society, then it is evident that they also prevent development and improvement of the situation in poor parts of the world, in particular. Based on the simple logic it applies that if the most basic human needs aren't met, there is usually no further development. Water is thus not only a prerequisite of life but also a basic **precondition of dignified life and social development**.

In 1992 at the Earth Summit in Rio de Janeiro, world state representatives at the high political level declared that no human development – and no worthwhile human life – is possible without water: 'Water is needed in all areas of life. A broad aim is to ensure sufficient supply of good quality water to the entire population on our planet´(UN 1992:275). In Rio, water became a part of sustainable development policy. Ten years later, the importance of water for sustainable development was once again confirmed at the World Summit on sustainable development in Johannesburg.

Water barrier

The concept of the so-called water barriers, proposed by Malin Falkenmark from the Stockholm International Water Institute, helps us to understand the relationship between water sufficiency and social development. She defined water barrier as the 'necessary minimal amount of water per person per year needed for the successful development of a society'. According to her calculations, every 1000 to 2000 people in a given society should have at their disposal a million cubic metres of freshwater a year. If this isn't so, the development potential of such society is considerably limited. (Romancov 2004:4). The concept of water barrier leads to an alternative in the form of societal development and not only to maintaining status quo. If we convert the above mentioned figure we come down to 1370 – 2740 of litres per person per day which is, of course, many times higher than the regular consumption of people in households. It is so because this figure also includes water consumption in industry and agriculture, i.e. water contained in goods which we consume indirectly.

Cutting the number of people without quality access to safe drinking water and basic sanitation in half became one of the aims of the MDGs declared by the UN in its fight against poverty declared in 2000.

The UN also recognizes the fundamental importance of access to safe water and of ensuring basic sanitation in the fight against poverty. In September 2000, it passed the so-called **Millennium Declaration** based on which member states committed to fulfilling eight Millennium Development Goals (MDGs) by 2015. In sum, eight broad aims include 18 partial aims that are measurable and bound by specific deadlines.

In 2000 the UN resolved to fulfil in the next 15 years the task of **cutting the number of people without a quality access to safe drinking water and basic sanitation in half**. In such an explicit way, water is mentioned in the seventh aim on ensuring environmentally sustainable development. Despite progress in this area, more than a billion of people world-wide remain without access to quality source of drinking water

Water, poverty and Millennium Development Goals (MDGs)

MDGs	How can water management contribute to meeting MDGs	
	directly	indirectly
1. Eradicate extreme poverty and hunger	• water as an important factor in agricultural and industrial production and other economic activities • investments in water infrastructure and services support local and regional development • enough water for irrigation increases food production contributing to hunger eradication and health improvement • sustainable fish and crop produce cultivated on a collective basis exists	• lower risks related to water support investments, production and development • prevention of degrading ecosystems contributes to sustainable development at the local level • better water quality leads to better health contributing to higher production capacity • working ecosystems hold enough water to produce foodstuffs • more reliable reservoirs of water enable cheaper foodstuff production leading to reduced hunger in cities
2. Achieve universal primary education		• improved health and reduced burden related to water fetching by girls in particular, contributes to higher rate of school attendance • quality sanitary facilities mean a safer school environment for girls and their existence increases the number of girls in schools
3. Promote gender equality and empower women	• water management programmes with special regard to women's situations help them to empower their status in society	• community organizations dealing with water management and including also women increase their social capital • lower time and health burden connected with fetching water gives women more time to engage in income-productive activities, and thus to balance roles
4. Reduce child mortality	• better quality and bigger amount of drinking water and water for industrial purposes together with a higher level of hygiene contribute to a reducing child sickness rate and mortality	• quality nutrition and enough food reduce the risk of getting ill
5. Improve maternal health	• improved health, sanitation level and lower burden related to fetching water reduce risk of death	• improved health and nutrition reduce the risk of anaemia and other diseases contributing to maternal mortality
6. Combat HIV/AIDS, malaria, and other diseases	• better access to water and sanitation helps households taking care of people infected with HIV/AIDS and increases the impact of home care programmes • better water management reduces the presence of mosquitoes and thus also the risk of spreading malaria • the occurrence of diseases caused by bad water quality is reduced as well	• improved health and nutrition and increased income reduce the probability of getting infected with HIV and AIDS. • improved health and nutrition reduces the probability of getting infected by other serious diseases
7. Ensure environmental sustainability	• better water management is a key factor in preserving ecosystems and their function • actions are taken to secure access to safe drinking water and sanitation for poor people in rural and urban areas (including slums)	• effective water management at the level of river basins contributes to the sustainability of ecosystems and reduces negative impacts of upper reaches of rivers on the lower ones • securing available and sustainable water services contributes to improved health and sanitation
8. Develop a global partnership for development		• fair trade conditions lead to a higher income from export of water-intensive production • actions calling for a reform of water services and investments into the needs of poor people are expressed in the form of commitments and acceptance of responsibility to eradicate poverty

Source: PEP 2006: 20–22

In addition, water is of fundamental importance for the implementation of other MDGs such as the eradication of poverty and hunger or increasing the school attendance rate of children.

and 2.6 billion people have no access to sanitary facilities (Tožička 2008). If the situation in the field of access to water and sanitation doesn't get better, we will hardly be successful in reaching aims such as reducing infant and maternal mortality, cutting the number of people suffering from hunger, enhancing the quality of life in slums or bridging the gap between boys and girls in education as well as ensuring universal primary education. All the MDGs fundamentally relate to water and their meeting inter alia depends on an effective and just global and local water management. Direct and indirect relations between specific MDGs and water are summarised in the table.

Water as a prerequisite of security

Apart from deepening or at least maintaining poverty, poor access to water and its scarcity contribute to worsening security situation and to conflicts.

Water has become a strategic raw material having geopolitical importance and in some areas it is even a basic prerequisite of regional security.

Formerly, oil used to be an invaluable mix of hydrocarbons to a man, i.e. before it became a basic fuel and raw material for production, and – in a similar way – water resources weren't of great importance when there was a plentitude of water everywhere. However, the situation has changed recently; water has become a valuable strategic raw material and in some parts of the world it is even a fundamental prerequisite of security. Some authors refer to water as blue gold (Barlow, Clarke 2005), just as others call oil black gold. Indeed, there is some resemblance between water and oil and it's not only the potential to bring about conflict: water as well as oil is not spread evenly the world, some countries have more water at their disposal compared to others, but it is needed to produce almost everything. Until recently, water had been considered to be a local not a global, resource. When thinking about oil, it is common to take into account the geopolitical consequences of its uneven distribution, but this hasn't been the case with water until recently. Nevertheless, this situation is gradually changing. (Hoekstra, Chapagain 2008:135)

Upper – lower: cooperation or conflict

'If there is a political will to peace, water is not an obstacle. If you search for reasons to fight, water offers a lot of opportunities to do that.' Uri Shamir, Israeli hydrology professor

In the introduction above, we compared water in the world to a lake with many villages located on its banks. If one village pollutes the water, everybody will face the consequences. As for this image, all villages have equal access to the lake. The situation changes when a source of underground water is put at stake. If one village drills out deep well and starts to consume too high amount of water, the level of underground water will decrease and the villages with shallower wells lose access to water. One way to understand better the world water system is to imagine it as a river along which the world population lives. The villages located on the upper reaches of the river have an advantage. They have enough clean water but if they pollute it, the villages on the lower reaches of the river cannot benefit from it. Every change on the upper reaches (a dam regulation, diverting channel) affects villages on the lower reaches.

Similar situations happen at the regional and national level. Water resources thus acquire **geopolitical** significance. Globally, there are 263 international river basins, they supply 40 % of the world population and account for 80% of water passing through the world rivers. Out of these, 19 river basins are shared by more than four states: The Danube has 17 users; The Congo, Nile, Niger, Rhine and Zambezi have from 9 to 11 users. Interventions on the upper reaches have an impact across borders and therefore, water has to become a tool of cooperation. If neighbouring political relations escalate, in the worst scenario water can become a catalyst of conflict. (Romancov 2004)

Most of the water in the worlds rivers presents a resource shared by several states. It can become a source of cooperation, but also a source of conflict.

Will there be wars over water?

The term 'war over water' is used for a new type of conflict over raw materials, which is being waged because of an acute lack of drinking water or water for industrial purposes. In fact, there hasn't yet been a war only over water so far or at least it hasn't been the cause of major conflicts. In places where there is a serious dispute over water, conflicts haven't turned to armed clashes so far (Egypt and Ethiopia) or it is only one, even though the key one, level of armed conflict (Israel and Palestine). The tension can be felt in the **Middle East** and in some **African** regions, in particular. For example, the conflict in Darfur is characterised by damaging wells and the intentional contamination of water resources.

'Wars over water are not future issues. Today there are wars over water everywhere around us, even though they are not always easily to be recognized. These wars are either paradigmatic taking the form of disputes over perception of water or real in which people fight with weapons in their hands.' (Shiva 2002:ix).

Unequal access of two countries isn't only determined by their **distance from the water source** but also by their **technical equipment** making the water accessible. Ethiopia faces the threat of water scarcity even though it lies on the upper reaches of the Blue Nile, but it isn't able to regulate it effectively. Nevertheless, such regulation would jeopardise the level of water on the lower reaches. Unlike Ethiopia, Egypt has technical means to regulate the Nile and uses it for effective agricultural irrigation. A dispute between these two states and Sudan situated on the White Nile has been going on for several years. In terms of military power, Egypt is much stronger and it has used this power rhetorically several times in its history.

Unequal access of two states isn't determined only by their distance from a water source but also by its technical equipment making the water accessible.

Water and the Israeli-Palestinian conflict

In the case of the Israeli-Palestinian conflict both countries share the same source of underground water which is throughout time decreasing as more people come to Israel and their consumption increases. Unlike Palestine, however, Israel possesses technologies to draw water from underground reservoirs but these often overlap to Palestinian territory. Consequently Israeli water consumption is five times higher than in Palestine and its inhabitants often suffer from water shortage in meeting their needs.

In 2002 in the framework of Israeli settlement policy a security wall building began. However, it doesn't respect the line set in 1967 and in many places it stretches far into Palestinian territory. Israel thus gets greater control over another part of water resources. The barrier made the lives of many Palestinians more complicated, it divided their lands, separated them from a water source, etc. (Čejka 2005:240). Most of the people work in agriculture and they have to face the big losses the wall building has caused to them as well as a loss of the possibility to irrigate. According to the Israeli non-governmental organisation B'Tselem, building of the wall affects the lives of 200 thousand residents, mostly farmers.

Without a doubt, water is one of the preconditions of peace in the Middle East. Palestine refuses peace proposals from Oslo as it wouldn't get control over all water resources on its territory.

'Peter Gleick, a leading expert on political aspects of water problems, sets four main reasons in his texts explaining why water has a conflict potential (whether it be domestic or international):

- if its local resources don't meet local needs;
- if more regions or states share the resources;
- unequal physical power of these partners;
- easy/difficult access to alternative resource of fresh water.'

(Gleick 1993, here according to Romancov, 2004:4)

Another current dispute stems from the regulation of upper reaches of a river and it concerns building a dam Illis on the of Tigris River in Turkey (which is part of a Turkish project of building 22 dams and 19 hydroelectric power plants). The risk of decreased flow rate on their territory and a drop in water quality has been a core of the dispute between Turkey and Syria and Iraq. Even Turkish minorities oppose the project as they would have to move due to the project. Turkey is obliged to consult the building and get approval from neighbouring states. But it hasn't done it so far.

Disputes over water are far from being waged only on the international level; they emerge even within countries between individual regions- between the country and city or between different classes in the society. These aren't always open conflicts – disputes over water can and often are of more latent nature.

City – country: cities draw water and attract people from the country

Urbanization is making constant progress. It is estimated that by 2015 the share of urban population in developing countries will rise to 67% (Mezřický 2011). A town is typical for a concentration of a large amount of people in a smaller area. Correspondingly, requirements on securing basic services go up, for example, water supply or sewerage drains. This can be a big problem in case a city is located in an area having insufficient water resources. Today, thanks to technology we can have a green city in the middle of a desert but water-intensity grows because it has to be brought in from elsewhere.

Due to a high concentration of people, cities often bring in water from a big distance at the expanse of the countryside..

As urbanization proceeds further, cities have to look for more sophisticated ways of ensuring a sufficient amount of water for its inhabitants. Some cities thus bring in water from areas at hundreds of kilometres distance. People living in these areas, however, miss the water gathered in huge amounts into water reservoirs and taken to a distant city. City demands are to the exclusion of country where the burden falls mainly on small farmers (UNDP 2006:17)

Water taken over by a city: Los Angeles

The desert city of Los Angeles presents a case of a violent water supply solution for the city. Despite protests, the head of the water management department in Los Angeles, William Mulholland, took water used by farmers in Owens Halley and brought it a distant city (320 km). This enabled the desert city to become the fastest growing city in the US. While the water-intensive cotton plantation emerged in this desert area, farmers in the above mentioned valley remained without water.

Currently, a similar dispute is going on in many parts of the world. For instance, Mexico City is one of the recent cases sucking water from its surroundings like a sponge. Water taken away leads to sharp social protests by the local farmers.

In most developing countries, rural areas are characterised by a high level of poverty and low political influence. The majority of the poor and undernourished people in the world still live in rural areas. To build an infrastructure for scattered dwellings is more complicated than to build if for urban population. Moreover, in rural areas incomes are usually lower. A political factor is also important, people in rural marginalized areas have a much weaker political voice than their urban counterparts. In addition, if the city needs water, it just often takes it despite the disagreement of people in rural areas. (UNDP 2006).

The poor – the rich: the poor pay more for water

Due to dissatisfactory conditions in the country, more and more people move to cities in the hope of a higher salary and better life. In most cases however, they only enlarge the rising number of citizens living in unofficial slums on the outskirts of cities where they often have no plumbing and are dependent on buying water.

There is no difference in public and private administration of water management system in a given city, poor people living in slums often pay much more money for water than they can afford and consequently, due to high debts they fall deeper into poverty. The cheapest water usually comes from official city operators. Illegal slum inhabitants, however, cannot connect to the existent urban infrastructure as it is banned to have plumbing in dwellings not in legal ownership. People are thus dependent on water from various intermediaries who supply them with expensive water of various quality. (UNDP 2006)

It's not only prices that are unfair. Poor people pay for it and its **price** can be five to ten times higher for citizens of the same town with higher income. There is also a gap in the **amount of water** which is limited for poor people so that richer and tourist parts of the city always have enough. For example in Nairobi, Kenya, poor quarters have reduced access to water in the dry seasons so as to secure thousands of litres per person per day for people living in the prosperous Parklands quarter where the water runs 24 hours a day. (UNDP 2006:53)

Unequal access to water

- Lima, Peru has at its disposal 300 litres of water per day per person. However, 60% of people get only 12% out of the absolute amount.
- In Ahmedabad, India 25% of the population has at its disposal 90% of water available to all.
- In Dar es Salaam, Tanzania people living in the prosperous quarter of Oyster Bay have at their disposal 166 litres per person per day; households without plumbing have only 8 litres.

(UNDP 2006)

The irony is that people living in poor quarters on the outskirts of cities of developing worlds in slums pay much more for water than their richer neighbours. Moreover, the amount of water at their disposal is limited.

20% of the poorest people spend more than 10% of their income on buying water (in Argentine, El Salvador, in Jamaica and Nicaragua) or up to 22% of their income (in Uganda). In the United Kingdom the water price corresponding to 3% of family income is considered to be a hardship.

(Gasparini, Tornarolli 2006, Narain 2006, here according to UNDP 2006)

Water scarcity problems of poor people living in slums are not caused by a real lack of water in cities but by its unjust distribution.

Absolute lack of water, i.e. a state of real water scarcity in a specific place, is hardly ever the cause of missing water in households (UNDP 2006:53). Most of the worlds cities have enough water; the problem is its unjust distribution between people living in prosperous and poor quarters.

Privatization: water as a commodity?

Does everybody have a right to water? Although this question as well as an answer to it might seem evident, there have been some international disputes over this issue, seemingly over terms. Is water a natural and economic source or a human right?

In Mexico in 2006, at the 4th World Forum on Water, four Latin-American countries – Uruguay, Cuba, Bolivia and Venezuela, submitted two claims: a) water should become a right, b) to exclude it from free trade agreements and from the World Trade Organization's influence. The attitude of Latin American countries stems from their experience in the last decades of water management liberalization in which water services have been approached as another field of business. Its consequences have jeopardized the lives of the poorest people. Nevertheless, both the World Bank and the rich countries refused this proposal.

Private – public: water as a trade commodity

Water supply problems in many cases exist due to underfunding. As some countries and towns were not able to ensure water supplies, it was suggested that an engagement of private actors would help and they were expected to restore infrastructure and make water services accessible to the wide public. This approach was advocated by both the World Bank and the World Trade Organization.

The first privatization took place alongside with the wave of neoliberal theory in the second half of 1980s in France where the largest water corporations of SUEZ and Veolia are established today. In the United Kingdom the privatizations took place between the years 1979-1990 when Margaret Thatcher was prime minister. In other parts of the world it gained momentum in the 1990s in connection with the **General Agreement on Trade in Services**, 1994 (GATS) striving for liberalization of trade in services including water. Such development led to the emergence of large water management companies and to a strong oligopoly of some of them. In 2001, the largest five companies controlled 73% of the market (Pinsent Masons 2007:18).

Water has become one of the most profitable articles in trade on the global level. In 2000, annual profits of the water management industry were estimated by Fortune magazine to roughly $ 400 billion which at that time amounted to 40% of the oil sector total profit and its profits were by one third higher than those of the pharmaceutical sector. At

The privatization of water management services was thought to enhance infrastructure and make water supplies accessible to all. Water has become a part of General Agreement on Trade in Services (GATS).

The largest water management companies according to the number of people they supply with water:

1. SUEZ (FR)
2. Veolia Environment (former Vivendi, FR)
3. Bouygues / Saur Group (FR)
4. Aguas Barcelona (SP)
5. RWE (D)
6. United Utilities / Bechtel (USA)

the same time the profit came only from 5% of the world population which takes water only from the private water management companies (Heyneardhi 2003). In 2007 this figure amounted to 11% corresponding to roughly 700 million people and it is estimated that by 2015 it will be 16% of the world population (Pinsent Masons 2007). According to the World Bank, the growth potential of the water market is very high. That is why water trade seems to be very attractive and promising for corporations in the future. Even though corporations compete with each other, their common aim will be to establish a global water market and ensure water that is considered a commodity as any other commodity so it can be traded freely (Heyneardhi 2003).

The global water market is controlled by a few large transnational companies which want water to be considered a commodity that can be freely traded based on market principles.

Water business takes place in two basic areas: ensuring water supply and waste drainage from households and trading water itself, most frequently in the form of packaged water. In practice, water trade liberalization means the unlimited opening of national markets for water supply services and the transfer of water management onto a private sector. (Heyneardhi 2003)

Trade in bottled water
Coca-Cola, Pepsi, Nestlé and Danone are the biggest players on the bottled water market. Trade is regulated less than water management services.

Forms of privatization

The general term privatization refers to many forms of private sector participation. Private businesses can take charge, for example, of water extraction itself from underground reservoirs, its purification, distribution, building or maintaining infrastructure.

Water service privatization can take many forms: complete privatization is less common, granting a licence or a contract awarded to private businesses, most frequently in the form of management contract.

Complete privatization means the complete transfer of the ownership and public enterprise management onto a private sector. Complete privatization is not very common in water management; some examples can be found in Chile or United Kingdom.

Granting a **licence** represents the most frequent way of private business participation where a private company takes charge of management and investments, bears the risk, charges fees and it is only the water management system ownership which remains in public hands. Licences are usually granted for 20-30 years. This is the case of water management in Manila, Philippines, Buenos Aires, Argentina, Jakarta, Indonesia and La Paz , Bolivia.

Other forms of public-private cooperation consist of various types of contracts awarded to private businesses. When awarding a **management contract** which along with a licence presents the most frequent type of privatization, the risk is shared between the business and public sector. This system is applied in Dakar, Senegal and Abidjan, Ivory Coast.

In fact, a public operator can hire a private business to do any job related to water services. The state bears the risk and investment. This form of public-private cooperation is usually not included in the general term of privatization. (UNDP 2006)

Privatization in many cases fell short of expectations because it didn't ensure access to water for poor inhabitants.

Falling short of expectations

Expectations fell short hoping that the liberalization of water management services would bring new investments and enlarge water networks and create competition ensuring the quality of offered services. Services through water network create a natural monopoly so there is no competition ensuring effective regulation in the interest of the consumer. Taking into account that the main business interest is to make profit, equal access to quality water and long term sustainability aren't usually priorities.

That is why **non-market regulation measures** are needed to ensure that contractors meet the quantitative as well as qualitative demands and equal access, i.e. secure users' interest. This means support of the poor, enlarging infrastructure to the marginalized areas and taking other measures.

British privatization

The British privatization which began in 1988 is considered to be one of the most massive actions of its type whatsoever. Ten regional water authorities were transformed to commercial enterprises on the basis of a licence granted for 25 years. In total, 10 monopoly enterprises were established in every region of Scotland and Northern Ireland. The original institutions' debt was written off before privatization, the companies enjoyed tax allowances and government subsidies. Despite having only a few impulses to invest into the system. The inflow of their investments began right before privatization and peaked in 1991 and 1992. Then it started to decrease. In addition, insufficient maintenance caused large losses of water and pollution including increased amount of pesticides. As the businesses focus on profits only and the laws weren't so stiff at first, paying penalties was more profitable than investments in enhancing infrastructure and water treatment plants. Between 1990 and 1997 the profit of these companied increased by 147 % but the cost of water in the first four years went up on average by 50 % annually. Due to high prices, within five years the number of households disconnected by water companies was three times higher. Such a policy invoked protests and in five years of protection these profitable companies were taken over by the water giants Veolia, SUEZ and RWE. In 1999 the Water Industry Act was passed banning the water disconnections. The government was forced to more rigorous regulation.

(Lobina, Hall 2001, UNDP 2006)

The eventual negative effects of privatizations are striking in developing countries, in particular. It has proved that the private sector cannot guarantee effectiveness on its own. Despite the expectations it didn't manage to significantly increase the number of households connected to the water system. To the contrary, higher tariffs in many cases made access to water impossible for the socially disadvantaged.

Cochabamba in Bolivia

The case of the town of Cochabamba, Bolivia, shows the most striking consequences of privatization. In 1999 the Bolivian government granted licence unfavourable to the state to the Aguas del Tunari business, a subsidiary of Betchel Company. The licence granted the company 16 % of the profit for 40 years for operating water services in the town. At the same time, Betchel gained control over hundreds of irrigation systems and community wells in rural areas so people were then forced to pay for water which they used to draw from the wells for free. This fact as well as 200% increase in the water cost in the town raised stormy reactions from the public lasting for about a year including violent police actions against demonstrations. Finally, the Betchel Company left the country and water management became a public system. However, the company sued the state of Bolivia asking for compensation for lost profits. The case was closed only due to foreign public and media pressure.[6]

The key problem in water service privatization is **the tension between the interests of firms focusing on profits and social needs and the**

interests of the public. Increasing fees for the purposes of generating profit and investment in other infrastructure can interfere with securing water for poor households. In the case of Cochabamba neither the Bolivian government, the company, nor the donor and international financial institutions communicated with people adequately and they didn't take into account the poor people perspective at all. There were no measures to protect common law and highly vulnerable Indian communities. Companies mostly enlarge the water system into the areas of middle and upper classes where they can count on recoverability. To extend the service pipes into the poorer parts of towns always requires the support of the state or community. (UNDP 2006)

Water management services naturally form a monopoly and the focus on profit doesn't take into account the water sources sustainability nor social justice. Therefore, certain public participation and non-market regulation is necessary.

Criticism brought about changes

At the turn of the millennium, the movement against privatization gained momentum in those parts of the world where its consequences were clearly negative. In cases when the users themselves were forced to stand up against the existing form of water management it was also in their interest to have the regulation and changes in water management under control. The current trend of big companies leaving developing countries where it is hard to do business is probably one of the consequences. Unlike in developed countries where they can use public infrastructure, these companies are forced to make big investments in developing countries (UNDP 2006).

In 2007 the five largest companies control only 42 % of the market in water services as oppose to 73 % a few years ago. More local actors entered the scene, formal and informal contractors (Pinsent Masons 2007).

Throughout time the lessons learnt have changed the view of neo-liberal experts. Katherin Sierra, vice-president of the World Bank's Structure and Development, explains in her interview for the Mexican daily La Jornada: 'We believed the private sector would realize important investments which could save the water management sector but it didn't. 90% of funds came from public sources also in the time of the strongest participation of private companies´ (Sierra 2007).

Hostility to privatization made big companies leave some of the developing countries where big investments in infrastructure were needed to ensure water availability for all inhabitants.

Co-determination of users

There has never been any doubt in the debates that water services should be financially supported so as to make the water system and sewerage available to all. But the fees cannot be an obstacle in access to water. People in Cochabamba refused to pay money when the sum was unbearable. When the way of financing is transparent and the cost of water bearable, people are willing to accept the rise in charges, as shown in the **case of Porto Alegre in Brazil**. The operator got public approval to raise the prices by 18 % in order to build a new water treatment plant on condition that the resulting profit will be re-invested in enhancing services and not transferred to the distant shareholders as their profit.

Another condition was that the cost of water supply will be fair due to price differentiation. Today, Porto Alegre's average water service fees are one of the lowest in the country.

Porto Alegre: how to make water accessible for all

The town of Porto Alegre, Brazil, has 1.4 million citizens and despite a high concentration of poverty it has the lowest child mortality in the country. Publicly owned municipal authority for water and sewerage is financially independent on the state and all its profit are reinvested into the system and aren't a subject to taxation. Minimally a quarter has to be invested in infrastructure. Despite financial independence, the average fee is low. Low income households and social care institutions pay half.

Regulatory authority is characterised by a high degree of public participation. The director general is appointed by the state but an advisory authority supervises and controls the director's decisions. Engineers, doctors, environmentalists, and non-governmental non-profit organizations are represented in it. Annually, communication with the public takes place at 44 meetings and in 16 places in the town. Billboards inform about current public expenses. Public supervision and the importance the public attains water is a strong driving force for high quality water services.

(UNDP 2006)

The success of public water management in Porto Alegre is based on:

- setting financial autonomy preventing political intervention in financial distribution
- participatory and transparent decision-making
- separation of regulator and service provider; a regulator supervises and publishes clearly defined standards and rules
- adequate public financing and the existence of a national strategy of enlarging the network for all

It is important for governments to spread regulation in the informal market which poor people use. In other words, it is necessary to communicate with contractors so as to secure rules for fair pricing and an adequate quality of water.

Sustainable and fair covering the costs related to water management services is, of course, necessary as water consumption in some countries is too high and collected fees too low to secure a viable system. In Bogota, for example, a progressive price system has been established in which low income groups pay a reasonable subsidised price. At the same time, an educational campaign reduced water consumption by 30 % per person. A similar system of price differentiation based on the consumption has been set up in municipalities in Spain and Italy where citizens have 40 litres of water per person per day at their disposal for free; water is adequately charged and if the consumption is exceeded (which is considered to be wasting), fees increase considerably.

What then?

Santiago de Chile is referred to as an example of working private water and sewerage management. The private sector there took over a functioning system with a common access to water not requiring big investments for enlarging infrastructure. The World Bank called it the most effective system in the entire Latin America even before privatization. On the other hand, public services in Singapore show better outputs than private services in the United Kingdom. The latter had to introduce regulation measures repeatedly as the private sector incurred big losses.

Water supply often has to face the following shortcomings: small investments, inequality, inefficiency, water losses. These shortcomings appear in public administration as well as in licence granting. It doesn't mean that public administration is all-powerful and that a private sector cannot ensure the citizens' needs. In some cases, privatization indeed contributed to a reduction of water losses and enlarging water network – mostly in cases when it was possible to establish a dialogue between operators and citizens. The cases of Morocco, South Africa, East Manila, Columbia and Senegal or Hydarabad, India, are some examples of a successful private sector participation in the water management (UNDP 2006)

Privatization helped to enlarge the water network in the cases where dialogue was established between operators and citizens.

Water management in the Czech Republic
Since 1993 the Czech government has been opened to water management sector privatizations. The 8 original operators together with Prague water mains and sewerages Co. enabled other 57 water and sewerage management companies to be established. With the exception of Northern Moravian water and sewerage management companies Ostrava a.s. (SmVAK), the infrastructure is owned by companies controlled by municipalities or the government and they are renting it to private operators. The most significant actor here is the French giant Veolia (it takes care of more than 1050 towns and villages). In this system a municipality owns a water management infrastructure, i.e. it has water rates under control. The municipality entrusts a professional company with the tasks of drinking water production, sewerage provision and water treatment. Apart from its know-how in the field the latter can manage a business effectively. The French SUEZ and Spanish FCC owning Czech SmVAK and others are represented here as well.t

In the course of the 20th century the concept of water has changed. The change can be illustrated, for example, on the way in which Mexican legislation referred to water in its laws during the liberalization process. Until 1972, it had referred to water as a **public good** to which a principle of inexcludability applies – no-one may be excluded from its consumption – and the principle of non-competition – one-man consumption doesn't limit the consumption of others. Such a commodity cannot be batched to people according to the price they pay for it. Since 1972 water has become a **national good** with which a state could manipulate if it was for the good of a nation. Since 1992 when Mexico signed the North American Free Trade Agreement (NAFTA) water has become an **economic good** so operators can deal with it correspondingly.

To ensure access to water for all, it is necessary to maintain at least to a certain extent some form of public control. Even in case services are provided by private companies, water should be understood as a public good to which a principle of inexcludability and non-competition applies.

However, a public good doesn't have to be always a public service. It can be provided by private actors who, nevertheless, don't have to maintain its public character. So the basic question is not whether a private sector should be or shouldn't be engaged in the water management. With regards to its main aim – the profit generation – it is the main key to the success of **maintaining the public control** as it was the case of Porto Alegre. En entry by private actors to water management services depends on the decision of each state itself and it shouldn't be exposed to pressure and threats from international forums and institutions.[7]

Water as a human right

'Water should be understood as a social and cultural good in the first place and only after that it can be considered as an economic good.' General Comment No. 15

While water in these latitudes is easily available almost in any quantity, in many places of the world such water sufficiency isn't taken for granted. As early as in 1999 the UN published a report GEO-2000 stating that water decrease on Earth poses a current global challenge as it is 'highly improbable that the world water cycle would successfully manage to adapt to the demands put on it the following decades' (UNEP 1995:15). Similarly, in the 1980s the World Wild Fund emphasized that 'fresh water, absolutely vital for human health, agriculture, industry and natural ecosystems, gradually runs out in many parts of the world' (WWF 1998:18).

Water is becoming a scarce commodity invoking a **commercial interest**. Trade in water and water services, as shown in the past, can jeopardise health and lives of people dependent on the sufficiency of safe water even more in case of inadequate regulation. Unequal water distribution leads to a need to explicitly determine **the human right to water** surprisingly facing a strong resistance.

'An access to safe water is a basic human need, hence a human right. Contaminated water destroys physical and social human health. It is an insult to human dignity.' Kofi Anan

Country commitments

According to UN Human Rights Council, countries have an obligation to secure an access to drinking water and sanitation to all people as is set in international conventions. Nevertheless, an explicit determination of a human right to water faces a strong resistance of many states.

In the current international law there is no consensus over the human right to water. In February 2008 UN Human Rights Council supported the interpretation of the right to water as a human right. In resolution establishing the function of an independent expert for human rights commitments related to safe drinking water and sanitation, it pointed out that human right documents including International covenant on economic, social and cultural rights (1966), Convention on the elimination of all forms of discrimination against women (1979) and the Convention on the rights of a child (1989) **oblige states to secure an access to safe drinking water and sanitation to all people with no exception**. To recognize the right to water as a right means to consider water to be a public good and to admit that securing access to clean water is a responsibility of governments in the first place.

In November 2002 the UN Council for economic, social and cultural rights confirmed, although implicitly, the fact that states have committed to respecting, protecting and meeting the right to water already in the 1966 International Covenant on economic, social and cultural rights. This was set in the **General Comment No. 15** to the International Covenant on economic, social and cultural rights: 'The right to water entitles everybody to a sufficient amount of safe, acceptable, physically accessible and financially reasonable water for personal consumption and needs in a household.' (CESR 2002:2). Even though it is not legally binding, the General Comment is a significant document. It is in fact a guide telling us how to rightly interpret commitments of states concerning the right to water resulting from the International Covenant on economic, social and cultural rights.

In the Covenant the right to water according to the General Comment, implicitly embedded in the Articles 11 and 12[8], is a fundamental human right in the same sense as the right to life.

Two other major human right conventions obliging states to comply with the right to water – this time explicitly – are the Convention on the Elimination of all forms of Discrimination Against Women (1979) and the Convention on the Rights of a Child (1989). In the former document in Article 14 countries committed to take any action necessary to eliminate discrimination against women in rural areas so as to enable women to participate in rural development based on gender equality, and to profit from it, and especially to guarantee a right for adequate living conditions to women mainly in housing and sanitation, electricity and **water supply**, transport and communication. In Article 24 of the Convention on the Rights of a Child it is set that countries recognize the right of a child to the highest achievable standard of health and to health and rehabilitation facilities as well as the right to **clean drinking water**, explicitly mentioned in the same Article, the following paragraph, point c).

Catarina de Albuquerque should help the states to comply with 'water commitments' in practice. In 2008 – for the following three years – she became an independent expert for human right commitments related to safe drinking water and sanitation. Apart from other things, her task is to contribute to the clarification of issues concerning the content and international statute of the right to water (The Right to Water 2008). It wouldn't be an easy task for Catarina de Albuquerque, nor for her followers as many influential states avoid explicit introduction of the right to water in the international law.

The fact that policy-makers were reserved as regards the explicit formulation of the right to water was reflected in the process of creating the resolution on establishing the function of an independent expert itself. At informal meetings prior to adopting the resolution, the US and Canada called for removing the explicit note on 'the right to water' from the text. In addition, the United Kingdom didn't like the explicit 'right to sanitation'. In order to reach a consensus, the states adopted a resolution containing an obligation of the states to secure ' access to water and sanitation' to people (UNHCR 2008). Obviously, this is not the same as to declare openly the right of an individual to water.

As was mentioned before, in 2006 at 4th the World Water Forum rich countries for which it is easier to make water accessible to most of their inhabitants refused along with the World Bank a proposal of Latin-American countries to exclude water from free trade agreements and declare access to safe water a human right. Nevertheless, many countries – some of them have already mobilized the public to secure water for all – incorporated human right to an access to safe water in their national legislation. In Uruguay, for example, people in 2004 referenda decided to include a schedule on the human right to water to their constitution. The same applies to Congo, Ethiopia, Gambia, Kenya, South Africa, Uganda, Zambia, Ecuador, Belgium and the US states of Massachusetts and Pennsylvania. (World Water Council 2008)

Documents in which countries – explicitly or implicitly – undertake to respect the right to water:

- International Covenant on Economic, Social and Cultural Rights (1966), Article 11 and 12
- Convention on the Elimination of All Forms of Discrimination Against Women (1979), Article 14
- Convention on the Rights of a Child (1989), Article 24

Even though water still remains a part of free trade agreements and a human right to water hasn't been definitely and explicitly enacted on the international level, a wide range of countries included a human right to an access to safe water in their national legislation.

Global good – global responsibility

When thinking about water, its available resources and the ways of using it, there are two different levels. In the regional context, the release of waste to waterways, inadequate wasting and the necessity to save water in households – all these aspects are frequently mentioned. In the world-wide, global context, the environmentalists often talk about the climate change increasingly shown in unpredictable weather fluctuations and natural catastrophes taking place randomly at various places on Earth.

In the workshop 'Who is behind water?' and in the text you are just about to finish reading we have tried to add one more aspect: international trade. Global flows of goods are also across-the-border flows of water in its virtual form. Water from our faucet has nothing in common with desiccating lakes of Kenya or Uzbekistan but along with our T-shirts thousands of litres of water were exported from Uzbekistan and roses which we give to each other, drew probably hundreds of litres out of Kenya or another developing country. Computers we use most probably polluted water in China when they were made and once we throw them away, their waste will affect water in India, West Africa or elsewhere.

Inaccessibility to clean water is an issue mainly in so-called developing countries where it affects people in the rural areas and growing cities. These countries to a large extent depend on export: with industrial development and intensive export agriculture combined with low environmental standards that are pushing prices for consumers down, we jointly impair the existing accessible water resources.

We are linked to water scarcity issues in other parts of the world through international trade in goods.

Notes

1 This statement comes from the introduction to the 3rd World Water Report regularly published by the World Programme assessing the state of water in the world: WWAP – World Water Assessment Programme (2009): *3rd UN World Water Development Report: Water for People, Water for Life. Water in a Changing World*. UNESCO Publishing, p. 15. [online] Available at: http://www.unesco.org/water/wwap/wwdr/wwdr3/index.shtml (cit. 1.8. 2009).

2 We used the water scarcity definition according to The Water Project: International Water Management Institute (IWMI), The Global Podium (no date): *Water Scarcity*. [online] Available at: http://podium.iwmi.org/podium/Scare.asp (cit. 28.7. 2009). The Water Project (no date): *Global Water Shortage: Water Scarcity & How to Help*. [online] Available at: http://thewaterproject.org/water_scarcity.asp (cit. 28.7. 2009).

3 Varied amounts of water needed for cotton cultivation in individual countries are determined by the different quality of the natural environment: wetness of the land, relative humidity etc.

4 Data used in this chapter are derived from the United Nations Development Programme 2006 and a publication by the Poverty-Environment Partnership: PEP – Poverty-Environment Partnership (2006): *Linking Poverty Reduction and Water Management*. [online] Available at: http://www.who.int/water_sanitation_health/resources/povertyreduc2.pdf (cit. 26.1. 2009). UNDP – United Nations Development Programme (2006): *Human Development Report 2006. Beyond Scarcity: Power, poverty and the global water crisis*. New York: UNDP. [online] Available at: http://hdr.undp.org/en/reports/global/hdr2006/ (cit. 26.1. 2009).

5 UNESCO – United Nations Educational, Scientific and Cultural Organization, FAO – Food and Agriculture Organization, WHO – World Health Organization.

6 The case of Cochabamba is, for example, described in J. Shultz's article 'Bolivia's War Over Water' published on the website of The Democracy Center. Available at: http://democracyctr.org/bolivia/investigations/water/the_water_war.htm (cit. 23.11. 2008).

7 At the international level, the EU imposes pressure on other countries to create conditions for water sector privatization. In 2002 the EU on the ground of the World Trade Organization (WTO) in the framework of discussing the General Agreement on Trade in Services (GATS) set its requirements for 27 countries including inter alia Bangladesh, Brazil, Tanzania and Mozambique to enable private European transnational water companies to access the drinking water supply.

8 Article 11 on human right to adequate standard of living including adequate food, clothes and housing, also covers – according to the General Comment – the right to water as water being a prerequisite to adequate standard of living. Similarly, based on the Comment the right to water is implicitly contained in Article 12 on the highest accessible standard of health.

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Why water

We know that we should save water, that quality of tap-water is often not worse than of packaged water, that shower consumes less water than a bath and that we should turn off the water while brushing our teeth. Why then do we need a manual dealing with water? Why water outright as a condition for development? While for Europeans flowing tap water is taken for granted, the reality for millions of people all over the world is totally different. There are such who call it "blue gold" in the same fashion others used to call oil "black gold". Water, like oil, is a shared global resource – some countries are water-abundant and yet others face its shortage. Neither water courses, nor bodies of water respect national boundaries and it is obvious that water sources are not distributed equally among different parts of the globe. Water – similarly to oil – is also needed for the production of a huge quantity of things. Water can equally become a source of cooperation as well as conflict. Should water therefore be commercialized, like oil? Who owns water and who and why should pay for it? The difference between water and oil seems clear: water is not only important in industry, where profit is what matters most, but its lack decisively impacts social life – human health, dignity and human lives as such. The workshop on water will guide us through various parts of the world where clean drinking water is by far not the norm. On our way, we will meet fishermen that have seen their lake dry out in front of their very eyes, urban dwellers whose water has been polluted by factories, and cattle herdsmen who cannot feed their herds with water as a result of commercial interests. Although problems with water tend to occur rather locally and in fairly isolated cases, their context and nature are global. The workshop Over Troubled watter shows that problems with water at a local level in other countries can affect us via products and foodstuffs that we commonly consume. We drink water, eat water, dress in water and live in water – we do not consume water only directly, but also indirectly in the form of goods that we buy and whose production withdraws water from regions that are already lacking it. The workshop participants will become acquainted with specific problems connected with water based on group work. They will search for their causes and our approach towards them. The participants try to work out together when crises resulting from the lack of water are instigated by its physical absence and when by its unjust distribution. And finally, they attempt to find solutions – also in terms of our contribution.

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