

ISSUES AROUND WATER

ACTIVITY

GRADE 10



Resources required:

- **'Water Crisis - A short introduction' -introductory video (internet access needed)**
- **Downloaded/Printed Articles (links included below)**
- **Pens**
- **Writing paper**

Start the lesson with playing this short video introducing the topic of the global water crisis: <https://www.youtube.com/watch?v=JyzvcrZluf0>

Lead a discussion revolving around the key concept of the effects of not having access to clean water resources.

Use the following points to guide your discussion:

- Do we have water issues?
- Does everybody have access to clean water? If not- why?
- What do people need to do to get clean water?
- What are the effects of not having clean water?
- How do we think about something as local as taps and as global as freshwater? Is there a connection between these two ideas? What are they?

Divide learners into 3 (or more, depending on class size) groups. Each of the below articles above could be given to different groups to read, discuss and pick out the main points to share with the rest of the class.



Articles to use (see Addendums):

Article 1: <https://worldfinancialreview.com/water-wastage-in-agriculture/>

Article 2: <https://agrifoodsa.info/news/4-ways-farmers-are-saving-water>

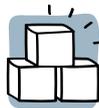
Article 3: <https://www.worldbank.org/en/topic/water-in-agriculture>

Key questions per Article:

Article 1: Individual use of water only accounts for 8% of water usage but agriculture accounts for 70%. Why does agriculture use that amount of water?

Article 2: What can we do to change the use of water by agriculture? (Maybe they can find examples of farms that are implementing water-saving strategies?)

Article 3: Whose responsibility is it to reduce water usage? This article is about how population growth affects the amount of food that needs to be produced - therefore we need to control our population size.



Extension: Now that the whole class has all the information, they could discuss/ brainstorm what actions they could take to realistically save water on a more global scale.

The articles can be used in this lesson or a separate lesson for English if the time does not allow it.

Learners can calculate their personal water footprints using the following link: <https://www.watercalculator.org/>

ADDENDUM A: ARTICLE 1

Water Wastage in Agriculture

Agriculture relies on many elements to produce food, but the most important of them is water. Irrigated agriculture accounts for 40% of global food production. At the same time, this sector consumes about 70% of the world's water withdrawals, and only 10% is used efficiently. Today, population growth and climate change are making the problem of water waste even more acute.

Many regions are working to reduce water consumption, for example, by harvesting rainwater. Drip irrigation systems are gaining more and more popularity with farmers. In addition, there are other agriculture solutions provided with innovative technologies that will help us manage water waste even more efficiently in the future. In this piece, you can learn more about water waste in agriculture and how to deal with this problem.

CHALLENGES FOR WATER IN AGRICULTURE

Various government institutions, as well as a lack of funding, limit potential improvements in water management. Line ministries and agencies are not in the most favorable conditions for improving the efficiency and functionality of the agricultural water supply. In addition, the maintenance of the irrigation systems is poor. Mismanagement and inadequate operation lead to the fact that existing systems regularly lose their performance and need to be restored.

With all the existing problems and constraints, agricultural water resources management is going through a transformation period. Reorienting to a more modern and sustainable approach will take time. This approach involves providing incentives for innovation, transforming water management practices, and creating new sustainable services in the sector.

CAN AGRICULTURAL WATER USAGE BE EFFICIENT?

It turns out that there is no question of saving resources. The spent water resources are not fully utilized due to outdated and ineffective irrigation systems. Sprinkler heads are often used for watering, which evaporates half of the water. Recovering water that could have been used elsewhere but evaporated instead takes time, money, and energy. Fortunately, in today's world, there are many ways to improve water use. The list of such solutions includes, for example, drip irrigation.

Drip irrigation systems, of course correctly installed, contribute up to 80% water savings. In addition, farmers can develop their reservoirs and thereby relieve pressure on local watersheds. Despite the effectiveness of the proposed solutions, humanity should not stop at what has already been achieved because, in 30 years, there will be several billion more of us. Population growth implies an increase in the need for food, which means that all resources must be used as efficiently as possible.

TIPS TO WATER SAVING

Irrigation scheduling helps control how water is delivered and watering time and amount of water consumed. It is necessary to monitor the weather forecasts to plan irrigation and avoid waste efficiently. Smart sensors help monitor soil moisture. Based on these data, it is possible to regulate irrigation and supply water to certain zones where it is needed. Watering can also be done in the evening or at night when water evaporation slows down.

Drought-tolerant crops are the best option for growing in regions with water or natural rainfall. They are drought tolerant and will not die as a result of this phenomenon. Such crops include olives, tepary beans, and Armenian cucumbers. In any case, when choosing crops, one should rely on climatic conditions.

Collecting rainwater in purpose-built rainwater barrels on the farm provides additional resources. It is rather convenient during the period of heavy rains. After the rainy season, when drought sets in, the naturally obtained rainwater can be used to irrigate your crops.

Crop rotation is a practice that involves changing crops from season to year. Many farmers use this method to take care of the soil, maintain diversity and ensure fertility. It works because different crops need different nutrients, and they have time to recover as the plants change. Thus, you can increase yields without depleting the soil.

Californian farmers practice dry farming to grow olives, tomatoes, grapes, and apple trees. They rely on soil moisture in dry seasons without irrigation. In this case, a particular method of soil cultivation plays an important role. It is also essential to take into account the peculiarities of the microclimate. This type of farming involves improving the taste of products. However, it should be noted that dry farming yields less yield.

Conservation tillage involves the use of specialized plows and partial tillage implements. About 30% of vegetative crops must remain on the surface. This practice helps to increase water absorption and reduce evaporation. Moreover, conservation tillage avoids erosion and soil compaction.

Going organic brings positive changes to the environment. Organic farming practices help reduce environmental impact and conserve resources. In addition, research by the Rodale Institute reports that corn from organic farms yielded 30 percent more crops in dry years than corn from traditional farms.

Organic farms do not use synthetic chemicals and pesticides, and it helps to reduce water pollution. Thus, pure water remains in the soil saturated with organic matter. The organic fields also replenish the groundwater supply.

FINAL THOUGHTS

Waste of water in agriculture is a rather acute problem today. Fortunately, technological advances and reliable agricultural practices bring new ways to conserve water. Irrigation schedules, soil moisture sensors, and drip irrigation systems help farmers plan irrigation efficiently and deliver the valuable resource only to the areas that need it. Saving water also helps increase yields, which may contribute to meeting the growing demand for agricultural products.

Source: <https://worldfinancialreview.com/water-wastage-in-agriculture/>

ADDENDUM B: ARTICLE 2

4 WAYS FARMERS ARE SAVING WATER

The agricultural industry in South Africa has, on numerous occasions, faced droughts for varying lengths of time. During these dry periods, farmers have to rely on groundwater reserves in order to see them through the rainless season. Due to unregulated water reserves, farmers need to start practicing more sustainable water usage techniques in order to conserve for the future. Here are just some of the ways farmers are conserving water and paving the way for a more sustainable future.

HARVESTING AND STORING WATER

While usually relying on municipal water or boreholes, many farmers have started building their own storage dams to capture rainfall for use throughout dry seasons. During the rainy season the storage dam becomes full and can then be relied on during periods of drought. Well-managed storage dams can also become a water resource for livestock or local wildlife. The usage of storage dams creates greater water sustainability and minimises the impact on shared water resources.

SMART IRRIGATION SCHEDULING

The management of water usage is not limited to where the water reserves comes from. Water should also be properly and reliably used in frequency and amount. Smart irrigation management systems implemented by irrigation suppliers can assist farmers to schedule watering for when it is necessary. To determine when watering is necessary, and how much is needed, farmers carefully monitor plant and soil moisture, as well as the weather forecast.

ROTATIONAL GRAZING

Moving livestock between fields is the process known as rotational grazing. This practice enables the regrowth of pastures during rotational down time. Through this competent grazing management system, the water absorption and retention of fields is increased, therefore water runoff is decreased. Pastures then become more sustainable for usage during periods of drought.

COMPOST AND MULCH

The use of compost and mulch improves the structure of soil which in turn positively impacts its water-holding capacity. Mulch is used to conserve moisture by becoming a water absorption layer on top of the soil, this can then further breakdown into compost and increase the soil's ability to retain water. The use of compost and mulch is a sustainable practice which allows farmers and gardeners to retain more water in the soil during the dryer seasons.

Tip: While using alternative methods in order to optimise the use of rainwater and minimise the impact on local water resources, it is important to maintain and repair local water supply networks and drainage systems. Make use of reliable and sufficient plumbing services in order to efficiently use your municipal water supply, businesses like IPC Plumbing can complete all maintenance of pipes and fixtures while ensuring that legislation and policies are met for agribusinesses.

For more agribusiness water solutions, such as professional plumbing services and irrigation suppliers, browse through the Agrifood SA directory. Discover the best solution providers who can assist you in optimising your farm in order to save water and create more sustainability for the future.

Source: <https://agrifoodsa.info/news/4-ways-farmers-are-saving-water>

ADDENDUM C: ARTICLE 3

Water in Agriculture

The World Bank supports countries with sustainable intensification of agriculture through critical investments in irrigation infrastructure and key institutional reforms, which also help achieve Sustainable Development Goals (SDGs) on efficient use of water as well as on eliminating hunger.

Water is a critical input for agricultural production and plays an important role in food security. Irrigated agriculture represents 20 percent of the total cultivated land and contributes 40 percent of the total food produced worldwide. Irrigated agriculture is, on average, at least twice as productive per unit of land as rainfed agriculture, thereby allowing for more production intensification and crop diversification.

Due to population growth, urbanization, and climate change, competition for water resources is expected to increase, with a particular impact on agriculture. Population is expected to increase to over 10 billion by 2050, and whether urban or rural, this population will need food and fiber to meet its basic needs. Combined with the increased consumption of calories and more complex foods, which accompanies income growth in the developing world, it is estimated that agricultural production will need to expand by approximately 70% by 2050.

However, future demand on water by all sectors will require as much as 25 to 40% of water to be re-allocated from lower to higher productivity and employment activities, particularly in water stressed regions. In most cases, such reallocation is expected to come from agriculture due to its high share of water use. Currently, agriculture accounts (on average) for 70 percent of all freshwater withdrawals globally (and an even higher share of "consumptive water use" due to the evapotranspiration of crops).

The movement of water will need to be both physical and virtual. Physical movement of water can occur through changes in initial allocations of surface and groundwater resources mainly from the agricultural to urban, environmental, and industrial users. Water can also move virtually as the production of water intensive food, goods, and services is concentrated in water abundant localities and is traded to water scarce localities.

Inter-sectoral water re-allocations and significant shifts of water away from agriculture will also need to be accompanied by improvements in water use efficiency and improvements in water delivery systems. Improving the efficiency of water use in agriculture will also depend on matching of improvements main system (off-farm) with appropriate incentives for on-farm investments aiming to improve soil and water management. Such options will require improved water delivery systems to provide adequate on-demand service as well as use of advanced technologies (i.e. soil moisture sensors and satellite evapotranspiration measurements) to improve efficiency and productivity of water in agriculture.

Resolving the challenges of the future requires a thorough reconsideration of how water is managed in the agricultural sector, and how it can be repositioned in the broader context of overall water resources management and water security. Moreover, irrigation and drainage schemes, whether large or small, represent prominent spatially dispersed public works in the rural spaces. Thereby, they represent a logical vehicle for mobilizing employment opportunities into communities.

PRACTICAL CHALLENGES FOR WATER IN AGRICULTURE

The ability to improve water management in agriculture is typically constrained by inadequate policies, major institutional under-performance, and financing limitations. Critical public and private institutions (encompassing agricultural and water ministries, basin authorities, irrigation agencies, water users' and farmer organizations) generally lack the enabling environment and necessary capacities to effectively carry out their functions.

For example, basin authorities often hold limited ability to enforce water allocations and to convene stakeholders. Institutions charged with developing irrigation often limit themselves to capital-intensive larger scale schemes and tend to rely on public sector-based approaches rather than developing opportunities for small-scale private financing and irrigation management. Farmers and their organizations are also often responding to highly distorted incentive frameworks in terms of water pricing and agricultural support policies, which further hinder positive developments in the sector.

Moreover, most governments and water users fail to invest adequately in the maintenance of irrigation and drainage (I&D) systems. While inadequate management and operation may play a part in the poor performance of I&D systems, it is especially the failure to sufficiently maintain systems that results in their declining performance and the subsequent need for rehabilitation. This failure to provide adequate funds for maintenance of I&D systems has resulted in the "build-neglect-rehabilitate-neglect" cycle commonly observed in the sector.

Given the existing constraints above, the agricultural water management sector is currently in the process of repositioning itself towards modern and sustainable service provision. It proposes a singular water approach on building resilient water services and sustaining water resources, while also managing risks related to broader social and economic water-related impacts. This includes transforming governance and service provision as well as supporting watershed management and greening the sector and can be achieved by providing improved incentives for innovation, reforms, and accountability.

Source: <https://www.worldbank.org/en/topic/water-in-agriculture>