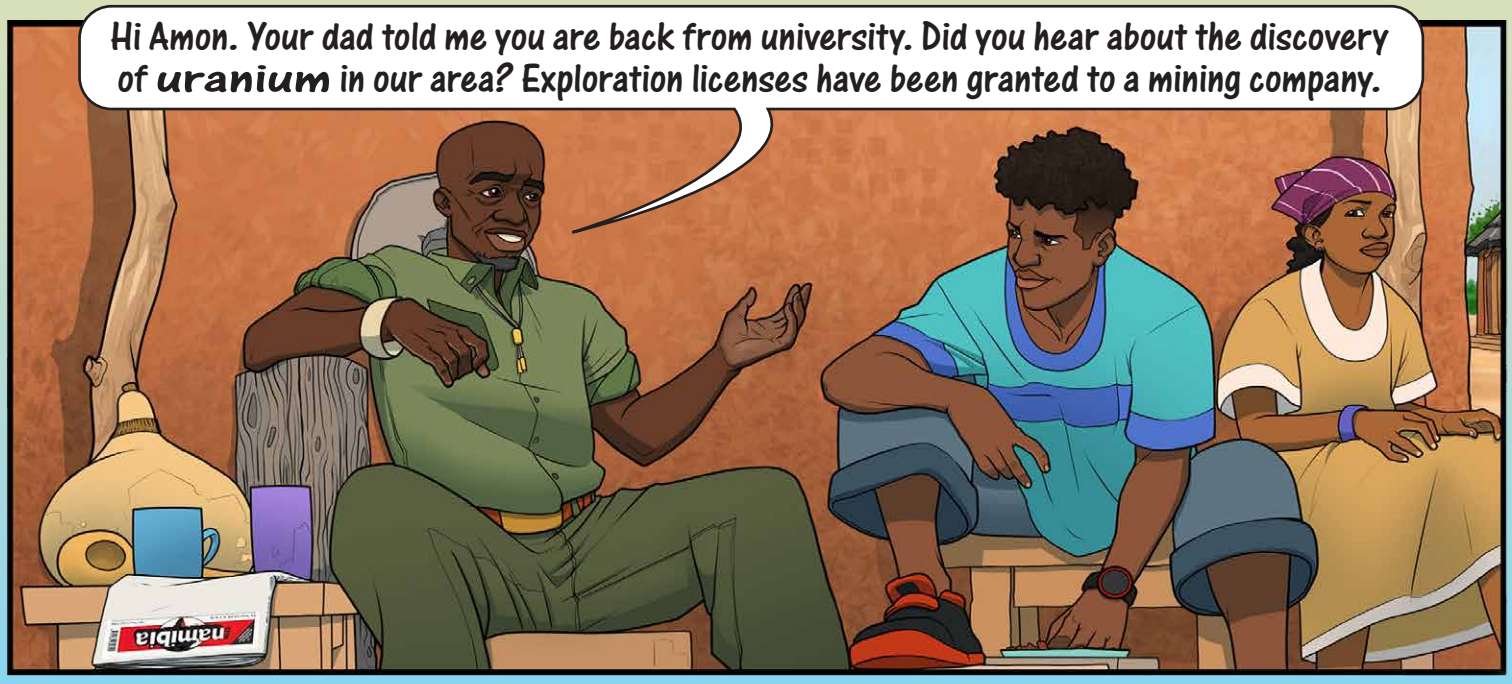
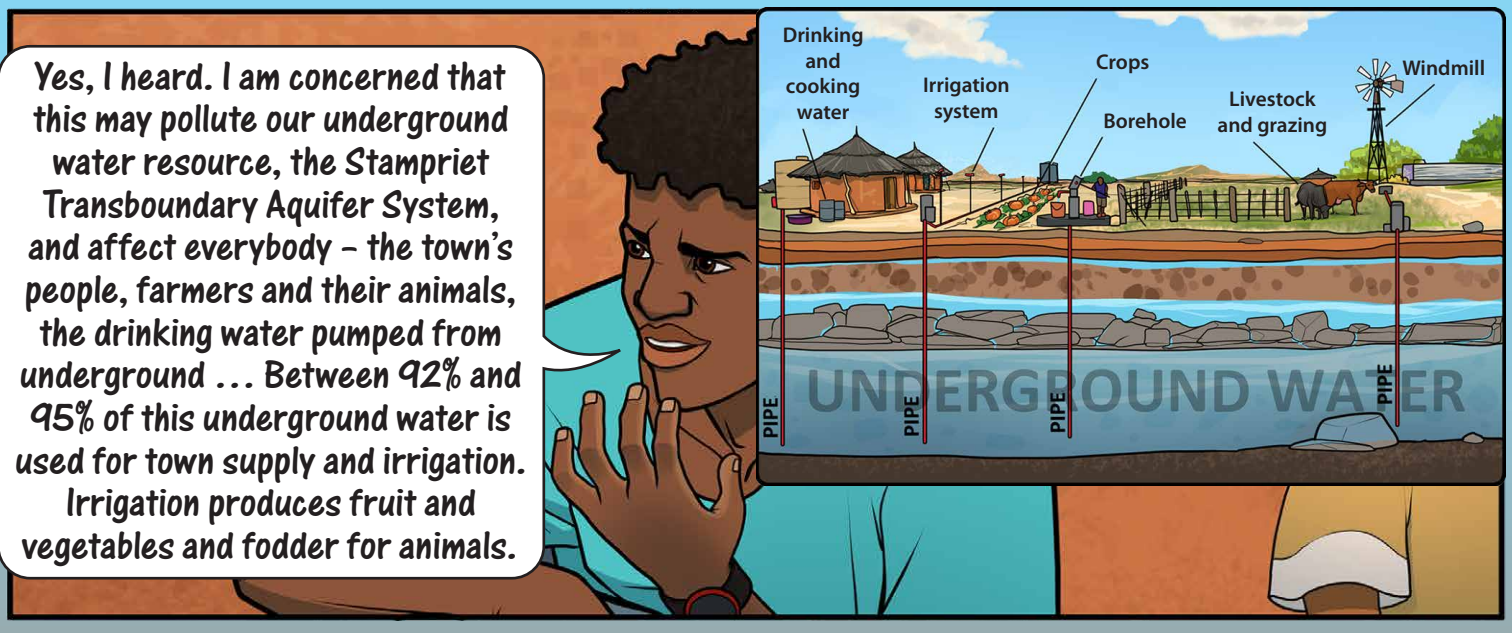
YELLOW CAKE

In-situ recovery mining, access to safe drinking water, and pollution





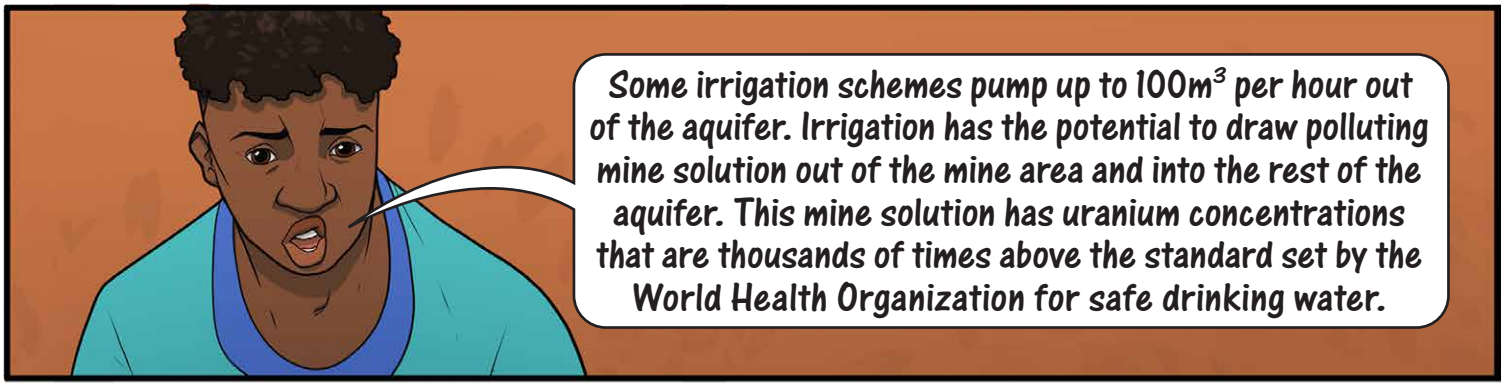
The Stampriet Transboundary Aquifer System, also known as Stampriet Artesian Basin (SAB), is an internationally shared underground water resource that covers the south-eastern part of Namibia and parts of South Africa and Botswana. It is the lifeblood of the whole region in which it is located – for people and their animals, the economy and the ecology. The aquifer covers an area of 86 647m^2 and there are an estimated 7 000 boreholes in this area. A deterioration of the water quality due to mining activities on the Namibian side would impact the entire region.

A Japanese International Cooperation Agency (JICA) report in 2002 estimated that the Auob Formation aquifers, which comprise three of the five aquifers that make up the SAB, contain 180 billion cubic metres (m^3) of freshwater for water supply, human consumption, livestock production and irrigation.

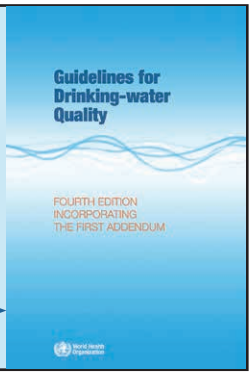
Instead of physically excavating ore from the earth, this technique involves drilling boreholes and wells and injecting a chemical solution into the ore body to dissolve the uranium. The pregnant solution, now containing the dissolved uranium, is extracted through other wells strategically placed within the ore body. This solution is then pumped to a processing facility at the surface, where the dissolved uranium is separated from the pregnant solution. The remaining water is then typically recycled back into the injection process, although a small portion of the water is disposed of in surface evaporation ponds.

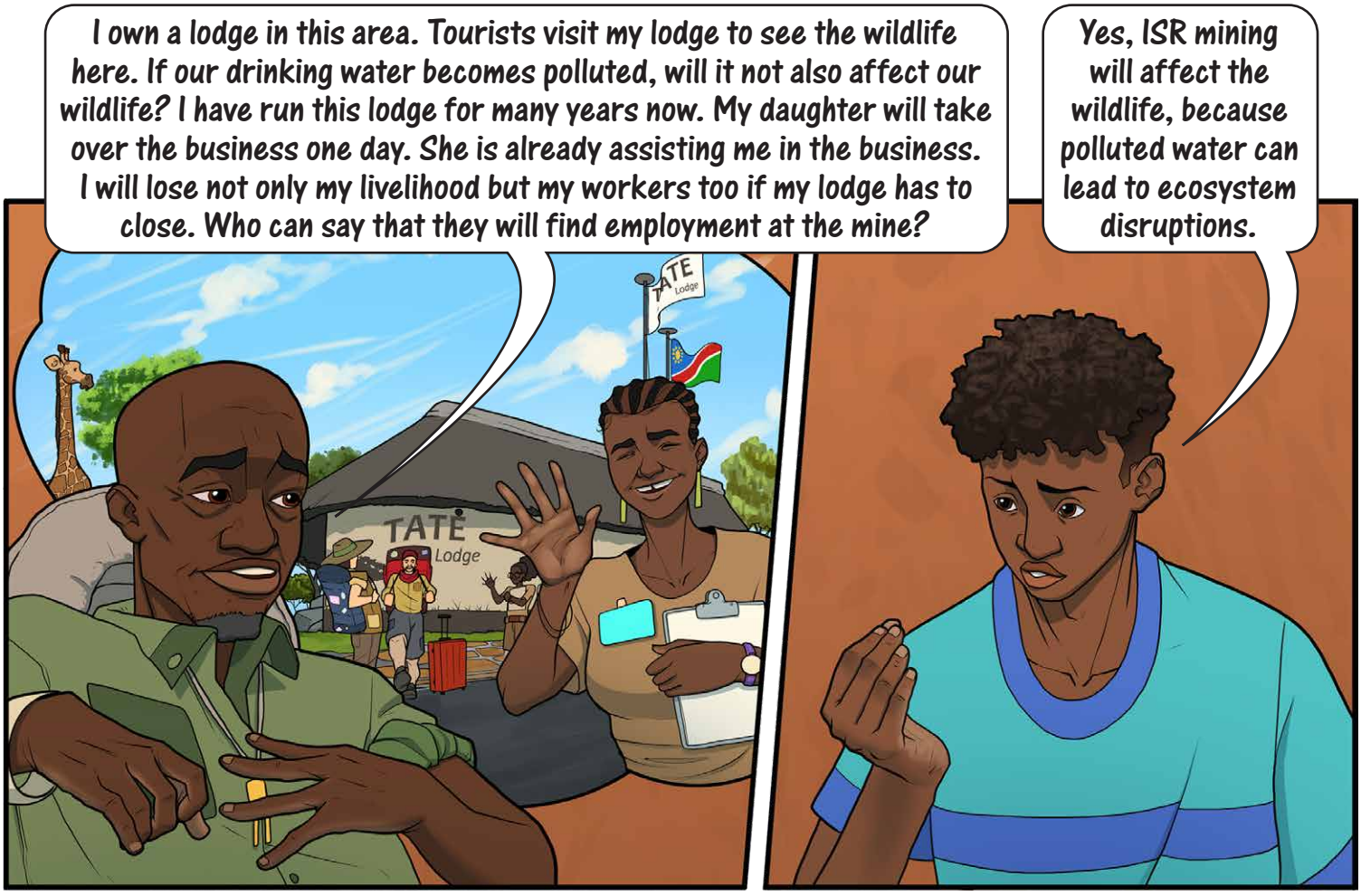
This type of mining introduces dissolved uranium, heavy metals, radioactive elements and process chemicals into underground water sources, rendering them unusable as drinking water and potentially posing significant health risks to communities that rely on this water. The heavy metals and radioactive elements released by ISR uranium mining, such as lead, cadmium, vanadium, thorium, polonium and arsenic, pose risks equivalent to that of uranium. ISR mining poses direct **unseen** underground risks to the aquifer drinking water.

The chemical solution used in ISR mining is called a **lixiviant** – commonly sulfuric acid with oxidising chemicals. The lixiviants injected into the ore body are often highly mobile and, if not carefully contained, can migrate beyond the target area. Even if they remain within the target area, the process itself can lead to aquifer degradation. Alterations in the water's pH and mineral composition can disrupt the natural balance of the groundwater system.



The World Health Organization (WHO) sets standards for drinking water quality through its Guidelines for Drinking-water Quality (GDWQ). These guidelines include recommended limits for various contaminants such as arsenic and uranium to ensure safe drinking water. The WHO guidelines serve as a basis for national regulations and standards to protect public health. (https://www.who.int/publications/i/item/9789241549950)

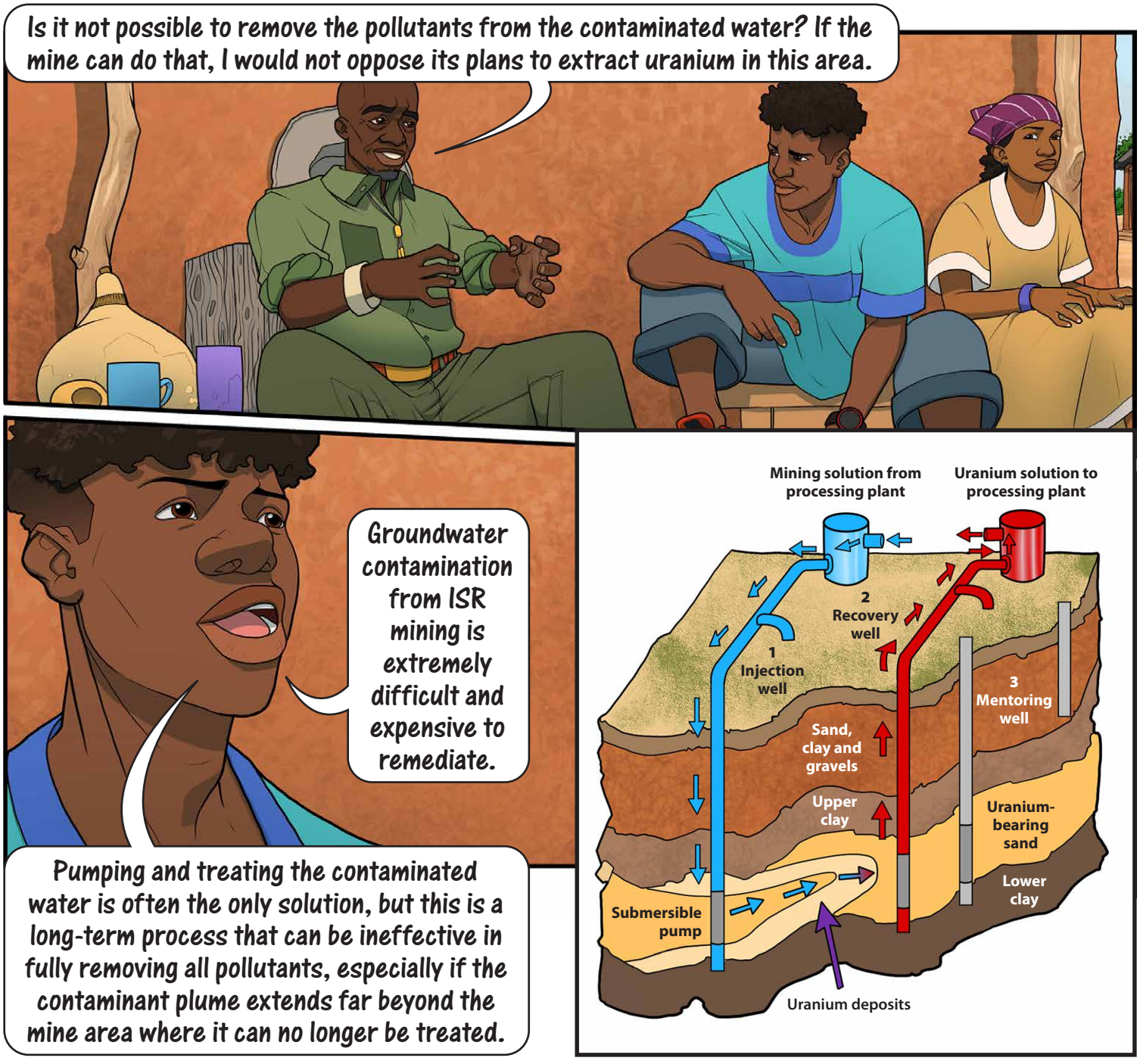




Ecosystem disruptions happen when natural habitats are significantly changed due to human activities like pollution or climate change. This can set off a chain reaction of negative effects for plants, animals and humans. Ecosystem disruptions affect food supply, health and the planet's future.

An ecosystem is a community of living organisms like plants, animals, birds, insects and microbes interacting with each other in their physical environment. In a healthy ecosystem everything is balanced.

Namibia's Omaheke Region is characterised by its savanna landscape, its mix of bush land (dry and thorn bush savanna) and thick woodland. This region is very diverse in flora and fauna. Approximately 230 bird species and almost 90 mammal species occur in Omaheke, including elephant, African wild dog, lion, leopard, roan antelope and giraffe.




I read this newspaper article about people in Tsumeb falling ill, possibly due to arsenic poisoning as a result of the smelter mine. Who is to say that something similar will not happen to us if we cannot rely on government to protect our interests?
TSUMEB
ARSENIC POISONING
IN
Radioactivity affects the lungs, liver, kidneys, central nervous system and other vital organs, and can cause cancer, a disease that may take years to build up in human or animal bodies. In the USA, 30 million tons of uranium ore was extracted from Navajo lands under leases with the Navajo Nation. Many of the Navajo tribe members secured positions as miners, working in close proximity to radioactive material that was later discovered to be the cause of high rates of lung and bone cancer. Getting compensation from mining companies is very difficult.
ARSENIC POISONING
There is a community meeting tomorrow at the Town Hall. You must attend. It is important that the community members listen to people like you. Most people here only care about what the mining companies can do for them. The mining company has set up a soup kitchen at the local school.


THE NEXT DAY AT THE MEETING
I am a farmer in this area. I have livestock and I also grow vegetables. My livelihood will be impacted if the aquifer is polluted.
NO TO UNSUSTAINABLE MINING – TODAY, TOMORROW AND IN THE FUTURE!
COMMUNITY MEETING
But what about those of us who do not have jobs? The mine promises to employ 600 people once it starts with its operations. We are already victims of poverty, people are unemployed, and we cannot even get resettlement farms.
The village and the Namibian economy will benefit from uranium mining.
VILLAGE COUNSELLOR

The need for jobs and the growth of our national and local economies should not outweigh the environmental concerns. But, at the same time, the long-term environmental threats to the aquifer cannot outweigh the short-term benefits of jobs. We need to look at other ways to improve the living standards of our communities. The Government cannot rely on mining alone to grow the economy.

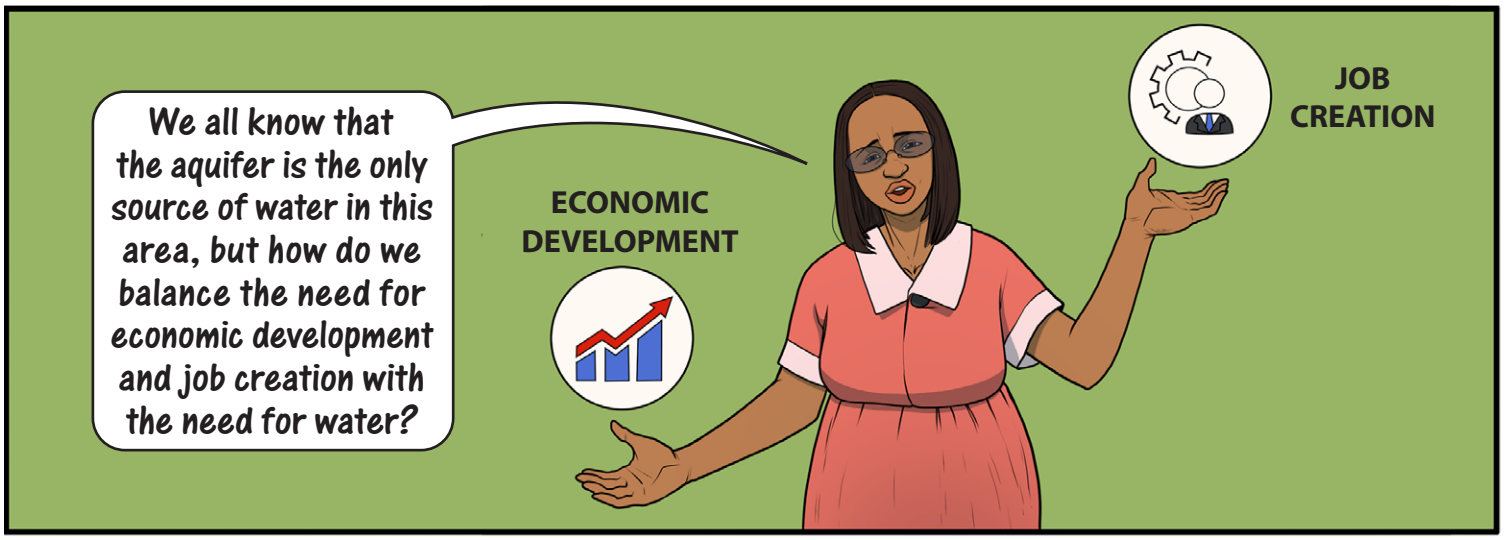
I thought that uranium mining is good for climate change. I am so tired of these environmental activists. Look around you. Our community is poor. Why would you oppose mining development?

The purpose of mining for uranium is almost exclusively to run nuclear power plants, which is considered a cleaner alternative to coal plants, as it eliminates greenhouse gas emissions.

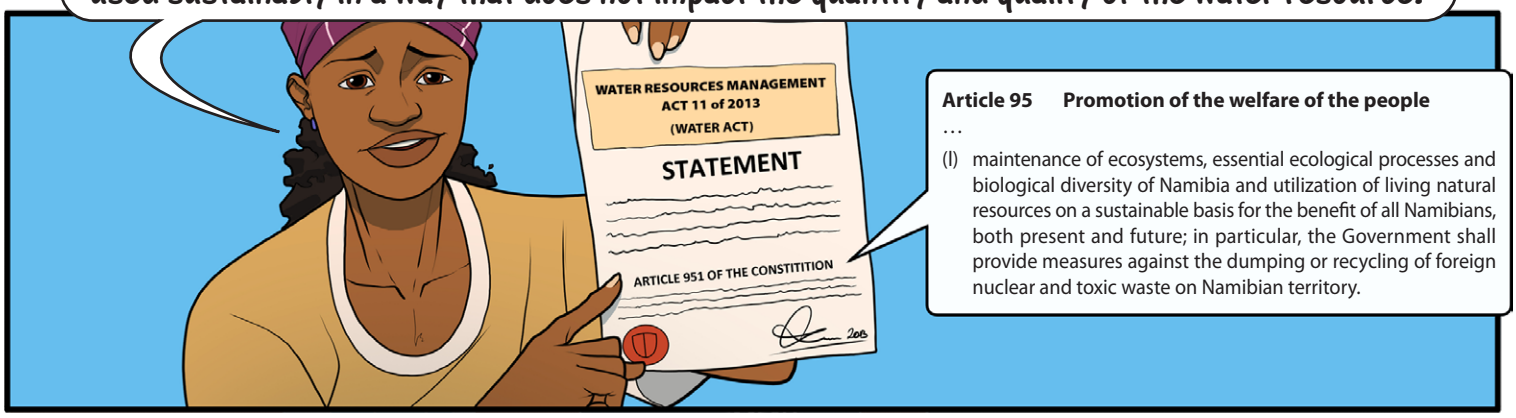
In 2022, 11% of the world's uranium was produced by Namibia. Namibia is the third-biggest producer of uranium worldwide, right behind, respectively, Canada (15%) and Kazakhstan (43%).

Namibia does not presently own any nuclear power plants, so the uranium produced here is exported as U3O8 (yellow cake) to meet the energy needs of other countries.

Namibia is a semi-desert country with low levels of rainfall, and increasingly continual drought conditions. On 22 May 2024, President Nangolo Mbumba declared a national state of emergency due to the worst drought that the country had experienced in 100 years. The current El Niño-induced drought is causing severe food insecurity and water scarcity. Nationally one in five people is food insecure.

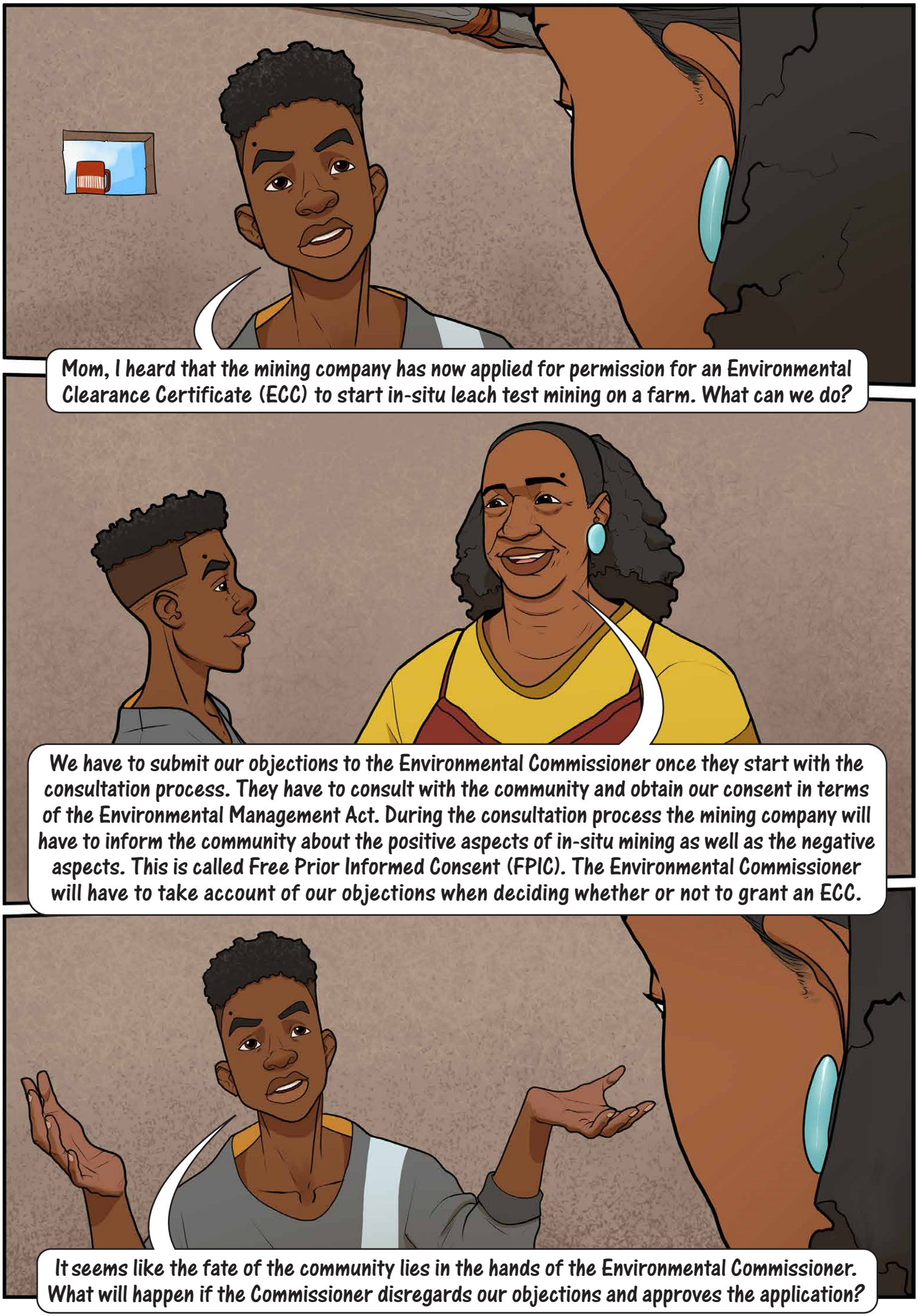


Article 95(l) of the Constitution dictates to the Government to use the natural resources sustainably and for the welfare of the people. The Water Act now states that water must be used sustainably in a way that does not impact the quantity and quality of the water resource.



The Water Act contains **14 principles**, according to which water resources are to be managed, developed, used, conserved and protected. One critically important principle is the prevention of water pollution. The Minister of Agriculture, Fisheries, Water and Land Reform must ensure that all Namibians have access to water. A water use permit must not be granted if the use will lead to people not having access to safe drinking water, or if the water quality for ecosystems cannot be maintained.


I just want to remind everyone that we can always invite the Ombudsman to inform us about our rights. The job of the Office of the Ombudsman is to promote fairness, accountability and transparency in the public sector, by resolving and investigating public comments and systemic issues that fall within their jurisdiction. This includes human rights violations, maladministration within the public sector, and the protection of our country's environment.
THE NEXT DAY ...
Mom, how was the community meeting? I wanted to attend but I had to do my homework. This issue will affect future generations. Grownups never think of how their decisions will impact us and future generations.
Environmental Management Act 7 of 2007
It went well. I am glad that the community was able to discuss an issue that will affect us all. Environmental rights for future generations means that decision makers have a moral and legal obligation to preserve natural resources and ecosystems for those who come after us. Protecting these rights ensures that future populations can access clean air, clean water, and biodiversity. The Environmental Management Act of 2007 (EMA) specifically recognises that natural resources have to be developed sustainably to meet the needs and aspirations of future generations.

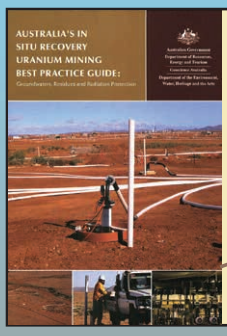

Mom, I heard that the mining company has now applied for permission for an Environmental Clearance Certificate (ECC) to start in-situ leach test mining on a farm. What can we do?
We have to submit our objections to the Environmental Commissioner once they start with the consultation process. They have to consult with the community and obtain our consent in terms of the Environmental Management Act. During the consultation process the mining company will have to inform the community about the positive aspects of in-situ mining as well as the negative aspects. This is called Free Prior Informed Consent (FPIC). The Environmental Commissioner will have to take account of our objections when deciding whether or not to grant an ECC.
It seems like the fate of the community lies in the hands of the Environmental Commissioner. What will happen if the Commissioner disregards our objections and approves the application?

In terms of the Environmental Management Act, if an appeal to the Minister of the decision of the Environmental Commissioner is unsuccessful, then our only option will be to approach the High Court. We have both the Constitution and the Water Act on our side. We must do everything in our power to protect the only water source we have in this area. Without access to safe drinking water, we will be forced to move to another town or risk our health.

Many of the community members may not support such an action.

Yes, but it's just that people are desperate for jobs. They will think differently once they start falling ill because of pollution of the aquifer. The Government has to step up and look at other ways to improve our community's socio-economic conditions.

Now my son, go make your mother a cup of tea, please. If your mother is to spread awareness in the community, she will need her strength. Our future depends on it.



Australia's in situ recovery uranium mining best practice guide does not allow exploration for and mining of uranium in aquifers of drinking-water quality. Though not binding in Namibia, it serves as a useful guide for determining what "the best way of doing things" is for in-situ mining in Namibia.

(Available at **https://www.nrc.gov/docs/ML1024/ML102440222.pdf**)

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