

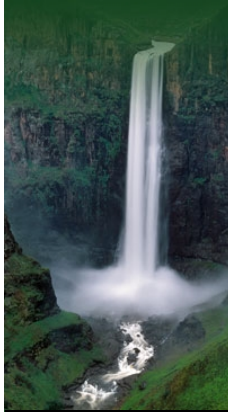
Orange-Senqu River Awareness Kit

[THE RIVER
BASIN](#)[PEOPLE AND
THE RIVER](#)[GOVERNANCE](#)[RESOURCE MANAGEMENT](#)

The River Basin

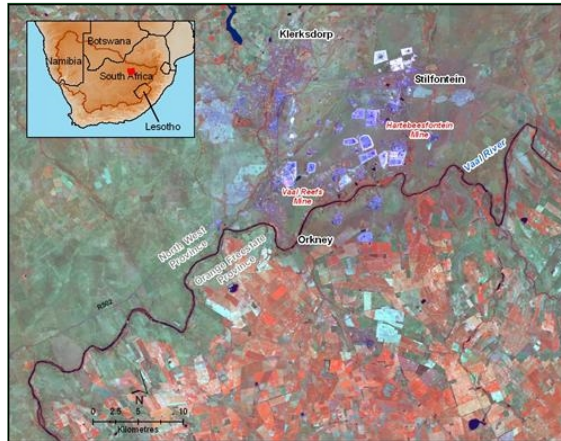
[Water Quality: Acidity, Heavy Metals and Radionuclides:](#)

- Introduction
- ▶ Geography
- ▶ Climate and Weather
- ▶ Hydrology
- ▶ **Water Quality**
- Principles of Water Quality
- Biological Water Quality Parameters
- Spiritual Meaning of Water
- Human Impacts to Water Quality
- Acidity, Heavy Metals and Radionuclides
- The Legacy of Gold Mining
- Coal Mining and water Solutions
- Heavy Metals
- ▶ **Radio-Nuclides**
- Groundwater Quality
- Water Quality Fitness for Use
- ▶ Ecology and Biodiversity
- References



Radio-Nuclides

Radio-nuclides can negatively impact biota through mutagenic and carcinogenic effects, given sufficient doses over a period of time. Uptake of radio-active particles may be direct, through ingestion, or indirect through the food chain. As there is no basin-wide radio-nuclide monitoring programme, the magnitude and significance of the problem is not known, especially its transboundary effects. The causes of radio-nuclide contamination in water can mainly be ascribed to a lack of adequate environmental management and control in the mines (particularly gold and uranium) and other industrial sites where radio-active materials may be produced or stored.



Gold mines along the Vaal River near Klerksdorp in the North West Province of South Africa.

Source: Hatfield 2009
(click to enlarge)

Gold Mines in the West Rand of South Africa, such as those around Carltonville, Klerksdorp and Welkom, have experienced high levels of radiation from Uranium-238, Thorium-230, Radium-226 and Radon-222 associated with Gold deposits (Government of North West Province 2002).

Box: Impacts of Radioactivity from Mining Activities

Impacts from radioactivity include: atmospheric impacts (radionuclide-contaminated dust); terrestrial environmental impacts (e.g., soil contamination, aquatic sediment contamination and bioaccumulation of radionuclides in ecosystems) and human health impacts (genetic mutations, radiation sickness and mental retardation at high levels). There is a growing body of evidence pointing that both the long- and short-term effects of radioactive substances present in the environment may be impacting on the health of the population of the Province, particularly in the gold mining areas.

Source: Government of North West Province 2002.

Feedback

[send a general website comment](#)

[report a specific problem with this page](#)

[Next: Groundwater Quality](#)



Basin Map

Explore the sub-basins of the Orange-Senqu River

[enter](#)

Video Tour

Tour video scenes along the Orange-Senqu River related to the River Basin

[enter](#)

Geography Maps

Investigate land cover and terrestrial ecoregions in the basin

[enter](#)

Water Cycle

Examine how the hydrologic cycle moves water through and around the earth

[enter](#)

Food Web

Explore the interactions of living organisms in aquatic environments

[enter](#)