背景

Zanbezi River Basin is the most valuble resource in Afica. Kariba Dam locates at the Zambia river bisin between Zambia and Zimbabwe. About 3400m³ of water flows past per second. So it provides lots of enerny for the local people. After the complete of the dam, the reservior supplies 1626 megawattsm of elecltricity to the parts of both Zambia and Zimbabwe and generates 6400 gigawatt-hours per annum. (wiki)However, due to the special natural and cultural environment, the climate change and increasing demands for water resource, for example, the situation of the dam is getting grim. The major issue is that there is a potential risk of dam breaking, which may result in 1.8 million deaths possibly in 8 hours and inevitably in 10 hours.

There is a urgent need to find a strategy to remove the danger of dam breaking.

文献资料

According to a report we find from the official website of the Institute of Risk Management of South Africa(IRMSA), the Kariba Dam is in a dangerous state. In 1959, the dam was seemed to be built on a solid bed of basalt. However, recent research shows that the torrents from the spillway have eroded that bedrock, carving a vast crater that has undercut the foundations of the Kariba Dam.

Engineers also give the warning that the whole dam will collapse if it is not urgently repaired. And then, a wall of water like a tsunami would rip through the Zambezi valley, which is a great threat for local people. Besides, the electircity supply would be cut down.

The Zambezi River Authority (ZRA) is interested in three options to remove potential danger as follows

问题重述

We require to establish some models to evaluate these three options above and provide sufficient details so that we can provide the descriptions of potential cost and profits related.Then, we are expected to analyse the effect of removing the Kariba Dam and replacing it with a series of ten to twenty smaller dams along the Zambezi river. We must make sure that the new system has the same water management capacity. In the mean time, we should provide the same or higher level of protection and management option.

To settle the problems above, we will proceed as follows