

Shores of resilience: Application of Nuclear and Isotopic Techniques in Ghana's Marine Environment

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Introduction

The Origin of Life

Life formed in the world's oceans about 3,500 million years ago. Cell membranes, proteins, and nucleic acids combined to create the first self-replicating, energy metabolizing organisms. The oldest evidence for life on Earth comes from carbon molecules found in rocks from the island of Isua in Greenland. These molecules have specific compositions that suggest that the carbon was processed by a living organism. However, these rocks were heated and squished so much that it is very difficult to be sure the traces are real.

How, where, why, and exactly when life evolved on Earth are still very active topics of scientific research. However, DNA analysis of organisms living today tells us that all living things on Earth share one common ancestor. This ancestor was similar to a modern bacteria - a simple, single-celled marine organism.

The next oldest and most robust evidence comes from Western Australia, where there are microscopic fossils and sedimentary structures called stromatolites in rocks that are about 3,450 million year old. The variety of fossils and stromatolites is so great that most scientists believe this evidence is very compelling.

3,500 million years ago

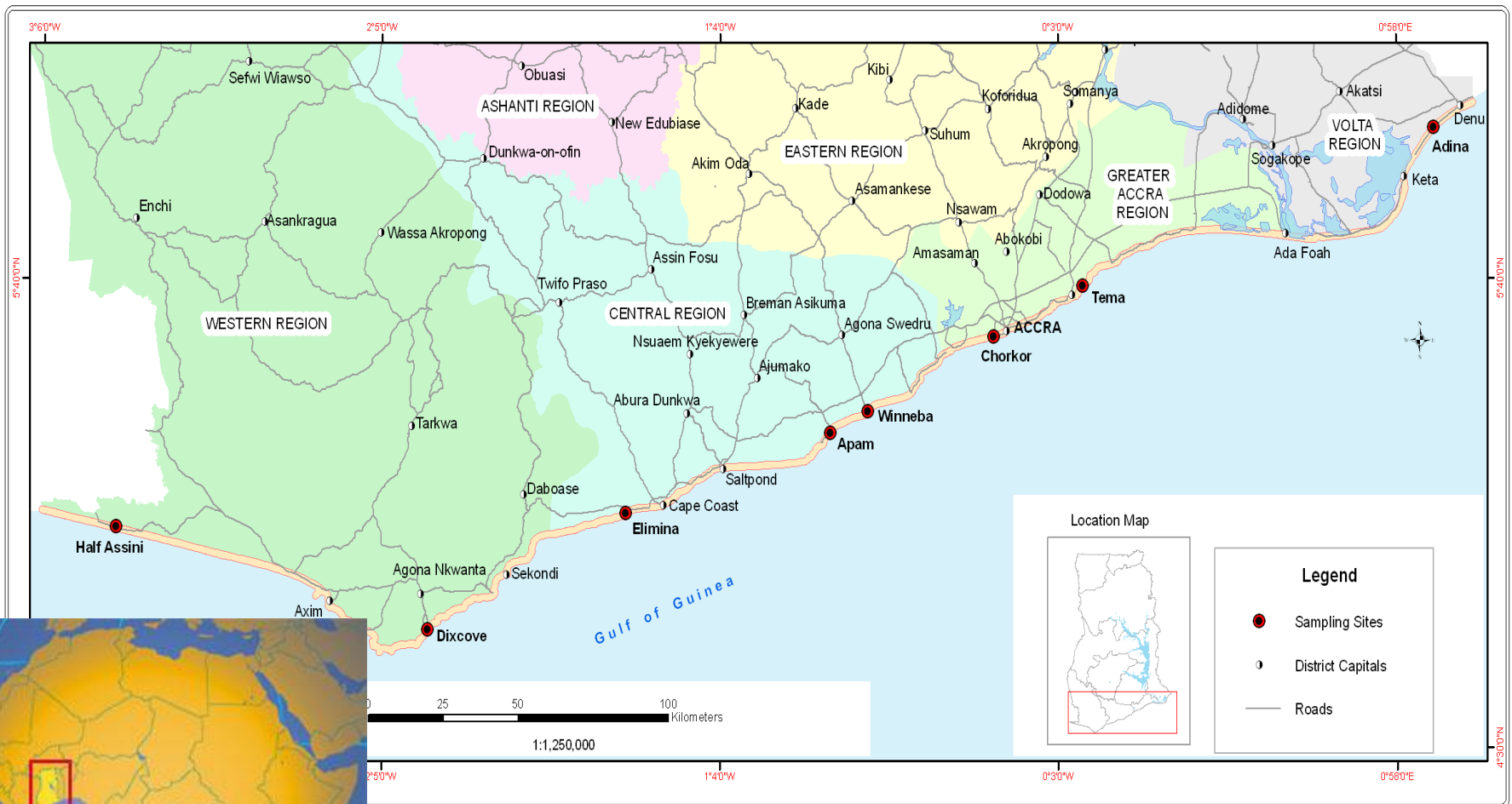
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Resources & Transportation

Ghana's Coast



Coast line stretch of 550 Km



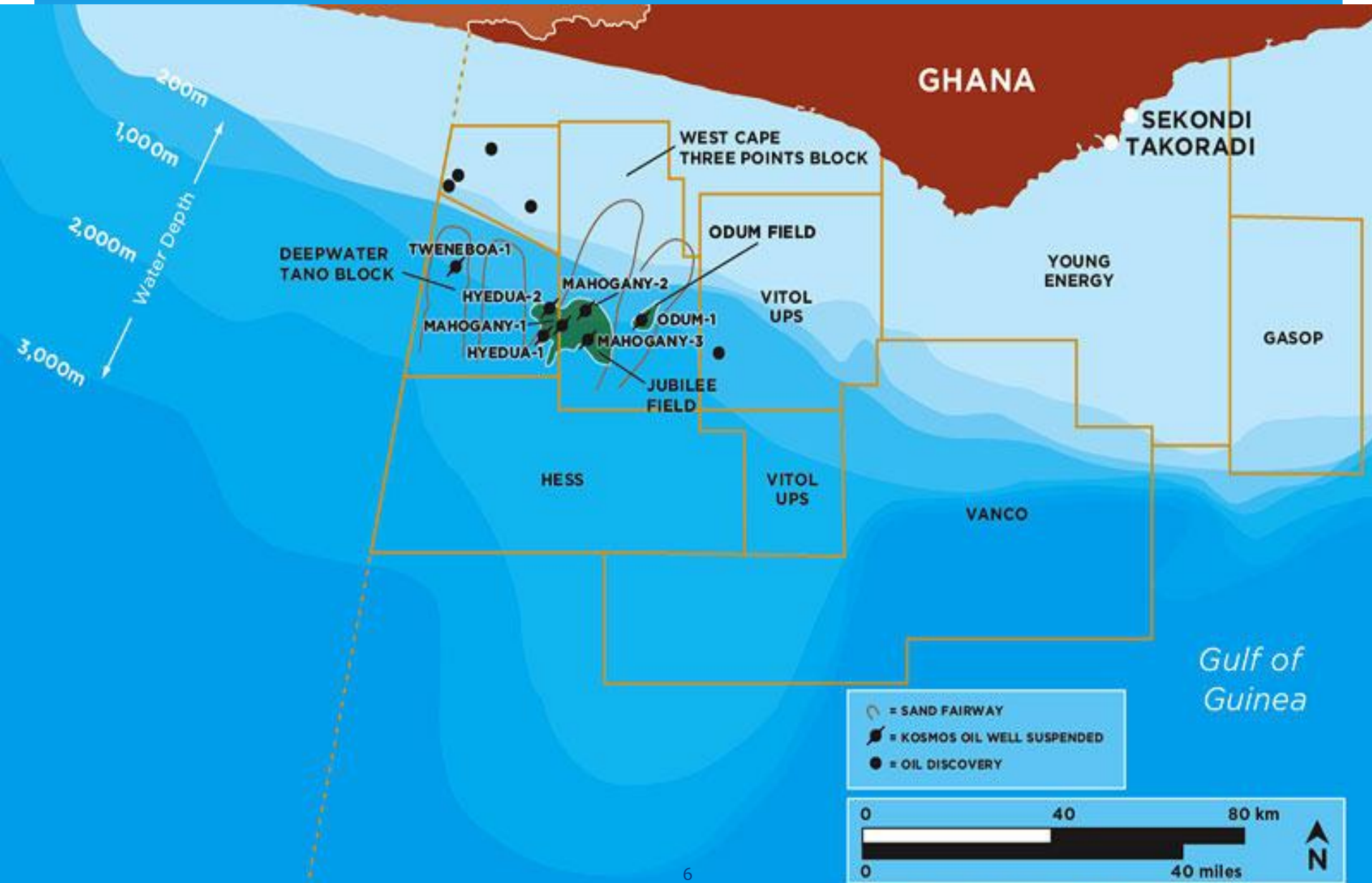
Ghana's Fisheries Resources



* Salt Production



OIL AND GAS EXTRACTION



Pollution Issues



Oil Pollution tracking using carbon isotopes

Algal bloom on Ghana's coast: possible use of Nitrogen isotopes (N_{14} & N_{15}) to track source of nutrient pollution

Use of Nuclear Analytical Techniques for Scientific Research in Ghana

Collaborations



Ghana Atomic Energy
Commission (GAEC)



University of Ghana

Nuclear and Isotopic Technique: Studies Undertaken

- * Toxic metal concentrations in deep-sea sediment from the Jubilee Oil Field and surrounding areas off the western coast of Ghana
- * Determination of radionuclides (^{210}Pb , ^{226}Ra and ^{137}Cs) in beach sands along the coastline of Ghana
- * Investigation of trace metals and organic contaminants in sea-foods along the coast of Ghana
- * Sediment core analysis of trace metal profiles and dating for determination of contamination history
- * Proposed studies of oil pollution and trans-boundary nutrient pollution with radioisotopes

Capacity Building IAEA Technical Co-operation Africa Projects

* **RAF /7/008 (2008-2012)**

- Enhancing regional capability for the assessment of contamination in the marine environment

Countries: **Egypt, Tunisia, Morocco, Ghana, Nigeria, Cote d'Ivoire, Tanzania and Kenya.**

RAF /7/009 (2012-2016)-

-Supporting an integrated approach for marine pollution monitoring using nuclear analytical techniques. Includes all 8 countries mentioned with the addition of **Benin, Cameroun, Senegal and Namibia**

Capacity Building

IAEA Technical Co-operation Africa Projects

(RAF/7/008 & RAF/7/009)



e.g. Workshop on AQUARISK

- Provides regional platform for marine pollution monitoring



¹¹Sediment corer



Alpha Spectrometer



