

CAUSES AND CONSEQUENCES OF SEA LEVEL CHANGES ON THE WESTERN INDIAN
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EFFECTS OF SEA LEVEL CHANGES ON COASTAL HUMAN SETTLEMENT
EXAMPLES FROM TANZANIA

BY

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1.0. Introduction

Comparatively large scale settlement of the East African seaboard began c.2000 years ago. This is the period when the original inhabitants, the proto-Bantu came into contact with the ancestors of the current Bantu speakers. By and large the newcomers absorbed or and drove away the proto-Bantu sparing only small pockets whose descendants inhabit some parts of the interior. From about 800 AD traders from parts of present day Middle East, the Indian subcontinent and Southeast Asia, also visited and settled along this coast.

Records of varying details and qualities are available and they point to the presence of settlements often termed cities or towns on the East African littoral. Some of these settlements or towns have disappeared and a few have been identified and excavated by archaeologists. There are several reasons that may contribute to the emergence and growth of settlements as well as their decay and disappearance. In this presentation I am suggesting that one of the principal reasons for the emergence and prosperity or decay and disappearance of settlements along the coast of mainland Tanzania is the changes in sea level in the area. For, such changes positively or adversely affect the security, economic viability and continued smooth contact with external people, among other things.

To make my suggestions more concrete I want to focus on four major sections of the Tanzania mainland coast, namely Bagamoyo, Dar-es-Salaam, Kilwa and Mikindani. This choice is deliberate because it is from there that we have sources that point to the issues addressed by this workshop.

1.1. The Bagamoyo Coast

Available information in reference to the sea level changes on the Tanzania section of the Indian Ocean coast holds that at some time in the past the sea level was much lower than what it is today. The submarine morphology of the continental shelf particularly the submerged channels evidence this phenomena (Temple 1970:23). Temple (ibid: 42) citing Moore (1963) has "postulated that the Bagamoyo Peninsula was

formed contemporaneously with the inland platform at a period of elevated sea levels during the Upper Pleistocene". He further suggests that at that period the peninsula must have formed a wide offshore sand bar fronting a deep marine embayment along the line of the lower Ruvu Valley.

It is presumed that infilling activity of the Ruvu river as well as successive small lowerings of the sea in its retreat from the peninsula created three raised beach levels at 2, 8, and 12 meters above MSL. The overall impact of this was twofold: the creation of an extensive fluvial flood plain in the Kigongo and Makurunge area west of the present Bagamoyo town; and the changing of old Kaole situated on the 2 meter beach level, a conducive site for settlement by the 13th century.

Old kaole is known to have had a relatively deep harbour to easily accommodate ocean going vessels of the time. However within three centuries it became an infilled mangrove zone thus making the town's ocean outlet and inlet impracticable. The inhabitants of the town had to subsequently move to the upper terrace at 12m. level. But this second position was not conducive to settlement by a large population. Old Kaole's economy was based on fishing and trading, thus ocean-oriented. With the blockage of the harbour this type of economy had to be either abandoned or continued elsewhere. In the case of old Kaole, it was abandoned and that time on Bagamoyo replaced its position.

The growth and development of Bagamoyo must also be seen in the light of an increased agricultural activity in the Ruvu river basin around Kigongo and Makurunge, 10 kilometers west. The basin developed into a rice growing area for both export and internal consumption.

South of Bagamoyo town Chami (1990a) has excavated a site called Changwehela which until then no archaeologist knew anything about. According to Chami this site which had among other remains graves and dwelling buildings, might have existed contemporarily with Old Kaole. He explains also that the beach at Changwehela site is now a saline area. It can be suggested that change in the sea level could have been one of the factors that caused the abandonment of

area as a settlement.

1.2. The Dar-es-Salaam Coast

The Dar-es-Salaam Coast includes that area situated South of Mbegani in the North to Mbwamaji South of Dar-es-Salaam city. Identified old settlements of particular relevance to the theme of this workshop are Kunduchi, Msasani, Kigamboni and Mbwamaji. This area has been identified as having been affected by some changes in the sea level because of morphological changes during Upper Pleistocene.

The creation of deep channels, raised reefs, terraces, sand barriers estuarine sediments and lagoons is cited as evidence of the impact of those changes (Temple *ibid.*: 38). Specific evidence is the Dar-es-Salaam channel between mainland and Kigamboni that forms the sea in and outlet and the harbour facilities; the Msasani coral reef and terraces; the Msimbazi Creek and the many lakes and swamps, such as Mwananyamala, Makurumla, Tandale and Minyonyoni west of the city.

Evidence of human settlement, economic activity including communication and contact with inland and overseas people has been recorded. The exact periods for the initial settlement of these areas still remains a moot question the main reasons being based on the definitions of settlements, cities and towns of the relevant scholars who have worked in the area. Suffice it to say that the changes on the sea level in the area have caused old human settlements and activities to move either towards the mainland or closer to the sea. A case in point is the abandonment of old coral stone buildings in the Msasani, Kigamboni and Mbwamaji areas up to the 19th century.

1.3. The Kilwa Coast

The Kilwa coast in this presentation covers the current area of Kilwa administrative district roughly running from the Rufiji river down to Mbwekuru river. Along the coast the major and old settlements include Kilwa Kisiwani, Kilwa Kivinje, Sango Mnara and a recent one, Kilwa Masoko. Archaeological information has suggested that the channel separating Kilwa

Kisiwani from Kilwa Masoko could have been shallower than it is today. That is to say prior to the 15th century, it was possible to cross the channel on foot during low tide. There is a story that Marimba, the indigenous ruler of Kilwa then, sold the island to an Arab son-in-law. The Arab paid him by a measure of cloth that had to be spread across the channel.

If these suggestions are acceptable it can be argued that the early settlement of Kilwa Kisiwani, (i.e. the island) was partly influenced by the fact that the sea level between it and the mainland was low. Kilwa Kisiwani's prosperity was based on both interior and overseas trade and fisheries economy with a big bias on agricultural cultivation practiced mainly on the mainland. From the structures excavated by Chittick in the 1950s, it is obvious that the island carried a much bigger population than it does today. Whether its decline can be, among other reasons, associated to the rise of the sea level which deepened the channel, or not this remains a question.

I am aware that recently human engineering activities geared to creating a deep harbour along the channel have affected its level. While this measure has hopefully increased contact between Kilwa and other coastal Tanzania towns, it has negative effects on the island - immediate mainland communication.

An archaeologist working on the island currently (Matteru 1990; - personal communication) observed that the island population has been declining from the time the harbour was deepened.

1.4. The Mikindani Coast

Alpers, (1975:159-160), in his discussion of the trends of the East African Slave Trade quotes Freeman - Granville (1965:172), who talks of "a little known river, (Mongalo), which flows through fertile and thickly populated country stretching a long way inland". Freeman-Granville, with the help of Saulnier de Mondet's descriptions of the whereabouts of Mongals river and port from where slaves were exported, placed the settlement or town between Lindi and Mikindani. These descriptions were made about two centuries ago.

Mungalo river originates from the eastern slopes of the Makonde plateau and pours its water in the Indian Ocean at Sudi. Sudi has existed as a settlement probably for a century or so. It can be suggested therefore that Sudi might have existed under another name or replaced Mangalo port and town after the latter declined.

I visited Sudi in 1988 and saw the once famous harbout choked with mangrove vegetation. There were a few boats (ngalawa) and no signs of serious utilization of the sea for economic and communication purposes. It was evident that while a portion of the Sudi population do some subsistence fishing and occasionally travel out to neighbouring Mikindani and Lindi in their boats, the twon is principally mainland oriented. It is easier and faster to travel by roads to both Mikindani and Lindi either through the tarmac road connection running between the two towns or through a dirty road close to the coast. The hinterland is still a fertile thickly populated and agriculturally active area.

Within the same zone of the Mikindani coast, Mikindani itself was once a flourishing human coastal settlement. By 1886 when the British visited Mikindani to establish Zanzibar's territorial limits along the east African caost, Mikindani was a major settlement with its own satelite small settlements at Milumba, Kimbari, Miseti, Muombe, Maraba and Mirembe (Gray 1950).

Although it cannot be established for certain that the current decline of Mikindani and tis satelites a possible impact of the rise fo the sea level cannot be ruled out either. For, if we can read from the vegetation of the once were ports, i.e., the encroachment of mangrove at Mikindani port followed by the intrusion of salt water and depostis at misets; it seems likely that sea level rise has its contribution here

2.0 Duscussion

The foregoing presentation has largely dwelt on events of the past, specifically from the 13th century to the present. These events may seem irrelevant to issues we need to address today. But I think to hold such a view is taking issues lightly. The impact that the rise of the sea level has on human settlement in our times can be directly related to one major area, namely the construction of residential buildings

and hotels close to the shoreline. Another but less significant area establishment of agricultural activities such as coconut palm and fruit tree plantations.

Residential and Hotel Structures

Along the Bagamoyo coast within the township of present day Bagamoyo two notable structures have been constructed during the postindependence era. There is a complex of buildings owned by corporations of the Bagamoyo District Council, i.e. Bagamoyo Development Corporation (BADECO) and Bagamoyo Fisheries Corporation (BAFICO); the Tanzania Ministry of Natural Resources also has some buildings for marine research. These structures are within a distance of one kilometer of the town's shoreline, all constructed of concrete blocks with corrugated iron roofs.

The aforementioned buildings were erected about twenty-five years ago. When I visited the area in 1974 and 1976 attempts to build stone walls as barriers to the strong incoming sea waves had already been completed. In 1985 half these barrier walls had gone, several coconut trees which once decorated the area between the beach and the hotel grounds were lying on the sand as dead logs. The strong sea has taken its toll.

While the investment put along the Bagamoyo beach explained above is relatively small and can easily be ignored, it is not the same with the Dar-es-Salaam beach. More or less during the same period the central Tanzanian government's Tourist Corporation and private individuals erected the Kunduchi Beach Hotel and Africana Hotel. There also was the Marine Fisheries Research Institute at Kunduchi and private Silver Sands and Rungwe Oceanic Hotels. All of these structures have been affected by erosion with different degrees of severity. Attempts to stop the invading sea from swallowing them up by construction of stone walls have not been successful. I do not have to profess that within the next decade good portions of these buildings will have been destroyed, the most vulnerable being Rungwe Oceanic and Africana.

Within the harbour area or rather the channel entrance to the harbour, the once beautiful State House sea front is also under threat. Although the State House itself is fairly safe up on a ridge, its frontal shoreline is not. Already in 1988 attempts were made to bring in large stones to create a barrier, the beautiful sandy beach with the once relatively comfortable "Habib Punja" concrete seats are gone. It is not uncommon for the Ocean Road which runs along the shoreline to be flooded during high tide, and the big sewer pipe is going pieces. But as late as 1985 the City Council of Dar-es-Salaam built a fish market structure of concrete blocks right on the beach. Of course before that there was the Banda Beach Night Club structure of the 1950s which now serves as a nucleus to Fisheries offices.

Between the Msimbazi creek at Silender Bridge and the Aga Kha Hospital, there are several government big officer houses which are delicately hanging. As the clock ticks, their days are numbered.

The southern beaches on the Kilwa and Mikindani coasts are less developed economically and therefore the fewer to build as close as possible to the shoreline is negligible. But it cannot be ruled out that the same will spread to the area in future. Already an isolated case of the Mtwara Beach Hotel was showing signs of its vulnerability in 1980; sea erosion was very obvious.

There are very few individuals who have built private houses in vulnerable places along the Tanzanian mainland coastline under discussion. Where residential houses are found these are mainly those classified as temporary fisherment's villages. They are often built of mangrove poles with palm frond thatching. They are easy to construct and demolish but well adapted to local conditions in terms of weather in particular.

Tanzania can thank God that a good part of its coast is still "healthy" but during the last one decade I have observed many changes that are already destroying what existed in the past. Many relatively well to do people mainly civil servants approaching retirement in Bagamoyo, Dar-es-Salaam and the other southern towns are taking up land

along the beach. As things stand now there is no scientifically guided policy on the settlement pattern. The ethnoscience of the fishermen who often knew where to settle and how to exploit the resource from both the sea and land is not being emulated. Rampat cultivation on the terraces and ridges is bringing all the good soils into the sea. The beaches are being polluted.

Agricultural Activities

Agricultural activities such as coconut palm and fruit tree plantations are not directly established on the beach but have effect on it. Essentially non-traditional agricultural forms of cultivation is responsible for the transportation of good soils to the sea. Such an activity is very vivid at the mouths of all the rivers in this area that pour their waters into the Indian Ocean. Dar-es-Salaam water supply has often been adversely affected because of silting which chokes the pumping machines at both upper and lower Ruvu river stations; over sedimentation at the reservoir facilities and the pipelines. The magnitude of this activity can be imagined only by the fact that sedimentation at one time blocked the approximately 1.5 meter diameter main pipeline.

3.0 Cocclusive Remarks

What the foregoing knowledge points to is that the Tanzania government will have to seriously address the whole question of land and sea use in an integrated approach. I have not deliberately talked of the senseless destruction of coral reefs by dynamiting, because that is outside the scope of my topic. However, construction of human dwelling structures along the beach, agricultural activities within both the immediate and distant hinterlands should be based on and respect certain baseline scientific research findings and suggestions. These resources are national and the government has the responsibility to ensure that they do not go to waste through uncoordinated activities by present day humans. Both the sea and land including their meeting

grounds, i.e. the beach and shoreline are our cultural heritage, they need our protection.

4.0 Acknowledgements

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