

## **SYNTHESIS OF SEASIDE HOUSE CONSIDERING AFFORDABLE LIMIT A CASE STUDY ON BANSHKHALI UPAZILA, CHITTAGONG, BANGLADESH**

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### **ABSTRACT**

*Bangladesh is bounded on the south by the Bay of Bengal. The coastline of Bangladesh is about 710 km long and the continental shelf extends over an area of about 24,800 sq. miles. of which about 37000km sq. is within 50m depth zone and have good fish resources. For this many of the people live in very near to the sea. But the coastal zone of Bangladesh has been facing wind -related natural disasters like Sidr, Tornado, Cyclone etc every year. These disasters cause large scale costs to socioeconomic conditions and destructions of their non-engineered houses constructed by the local people due to not having technical guidance and affordability. Considering the growth of unstable house and the damage level of housing due to past wind induced disasters. It is now very essential to develop an appropriate weather resistant housing model for safe shelter. The aim of this study is to investigate the present housing condition in the southern part of Bangladesh to develop and establish an inclusive, safe and sound design concept. Geographically, this study focuses on the Chittagong and can be considered as a little contribution to understanding further issues of seaside housing in Bangladesh. A range of distinctive interviews and related data will be collected from Banshkahli Gondamara area to understand the present circumstance of existing the housing pattern. The study will be summarized on the basis of the information provided by the respondents and collected physical measurement, material quality and built quality. By studying this research with regard to costing, coherent actions and means of improvement may be recognized. Such steps can be categorized for improving quality and function. Architects, Engineers, and seaside inhabitants may be tempted to take these factors into consideration while making such typologies of the house. On the other hand, Policymakers can take decision cited in this study into consideration while making related regulatory policies and framework.*

**KEYWORDS:** *Affordable Habitat, Fisherman/ Farmer's Dwelling, Seaside Shelter*

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### **Article History**

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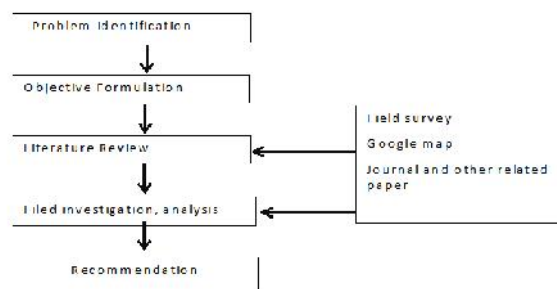
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### **INTRODUCTION**

Bangladesh has long been considered to be one of the most vulnerable countries in the world given human-induced climate change and subsequent sea-level rise. It is estimated to be the third most vulnerable country in terms of population exposed to sea level rise. Coastal Bangladesh is also a hub of hydro-meteorological disasters, including cyclones, tidal surges, floods, drought, saline water intrusion, Climate- and human-induced environmental and livelihood changes are growing concerns around the world's coastlines, especially populous deltas. Water logging, and land subsidence Bangladesh is not only vulnerable to the impacts of climate change. It also has a growing population

(139 million in 2011) with one of the highest population densities in the world (950 individual km<sup>-2</sup>), of which a large proportion live in poverty (~43%), and has real barriers to overcome in terms of continuing to feed its population. Bangladesh's ambition is to become a middle-income economy, reducing poverty substantially, and promoting and sustaining health and nutrition for 85 percent of its population by 2021. To achieve this ambitious plan, integrated governance is required that considers climatic, environmental and socioeconomic changes. This must be underpinned by studies that include macro- and micro-scale processes and the interlinked human–nature system. Coastal living is very important to achieve this goal. So we try to give them a planned housing pattern which is very necessary to improve their lively hood.

## METHODOLOGICAL FRAMEWORK



**Figure 1**

## LITERATURE SURVEY

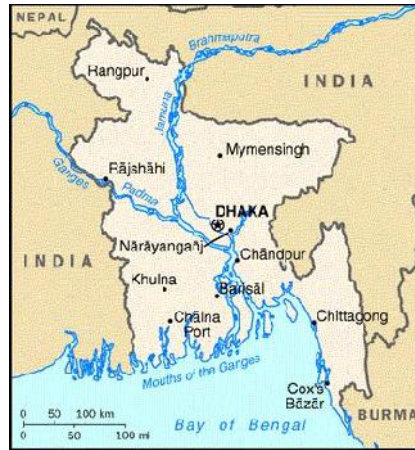
### Bangladesh Overview

Bangladesh has a 711-km long coastline that consists of a vast network of river systems draining the vast flow of the Ganges-Brahmaputra-Meghna River system. The coastline of Bangladesh broadly divided into three regions: the deltaic eastern region (Pacific type), the deltaic central region and the stable deltaic western region (Atlantic type).

A set of connections of rivers originated from the Himalayas flow over the country that carries sediments. The river release on the Bangladesh coastline is heavily loaded with sediments consisting of suspended and bed-load, giving rise to a highly energetic. A total of 35.1 million people lives in the coastal zone of Bangladesh in 2001, increasing from only 8.1 million a century earlier [1]

### Geography of Bangladesh

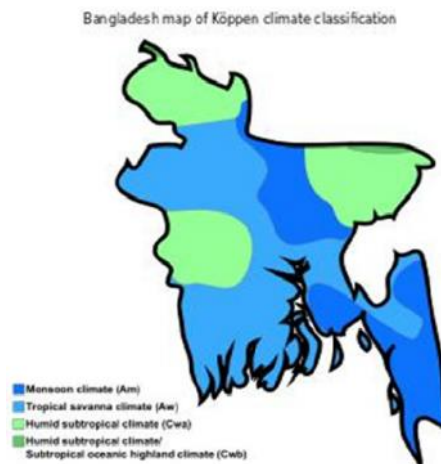
Bangladesh is a densely-populated, low-lying, mainly riverine country located in South Asia with a coastline of 580 km (360 mi) on the northern littoral of the Bay of Bengal. The delta plain of the Ganges (Padma), Brahmaputra (Jamuna), and Meghna Rivers and their tributaries occupy 79 percent of the country. Four uplifted blocks (including the Madhupur and Barind Tracts in the central and northwest) occupy 9 percent, and steep hill ranges up to ca 1,000 m high occupy 12 percent in the southeast (the [Chittagong Hill Tracts]) and in the northeast. Straddling the Tropic of Cancer, Bangladesh has a tropical monsoon climate characterized by heavy seasonal rainfall, high temperatures, and high humidity. Natural disasters such as floods and [cyclones] accompanied by storm surges periodically affect the country. Most of the country is intensively farmed, with rice as the main crop, grown in three seasons. Rapid urbanization is taking place with associated industrial and commercial development. Exports of garments and shrimps plus remittances from Bangladeshis working to abroad provide the country's three main sources of foreign exchange income.[1]



**Figure 2**

**Climate of Bangladesh**

Bangladesh has a tropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and high humidity. Regional climatic differences in this flat country are minor. Winds are mostly from the north and northwest in the winter, blowing gently at 1 to 3 kilometers per hour (0.6 to 1.9 mph) in northern and central areas and 3 to 6 kilometers per hour (1.9 to 3.7 mph) near the coast. From March to May, violent thunderstorms, called northwesterers by local English speakers, produce winds of up to 60 kilometers per hour (37.3 mph). During the intense storms of the early summer and late monsoon season, southerly winds of more than 160 kilometers per hour (99.4 mph) cause waves to crest as high as 6 meters (19.7 ft) in the Bay of Bengal, which brings disastrous flooding in coastal areas. Heavy rainfall is characteristic of Bangladesh causing it to flood every year. Except for the relatively dry western region of Rajshahi, where the annual rainfall is about 1,600 mm (63.0 in), most parts of the country receive at least 2,300 mm (90.6 in) of rainfall per year. Because of its location just south of the foothills of the Himalayas, where monsoon winds turn west and northwest, the region of Sylhet in northeastern Bangladesh receives the greatest average precipitation. From 1977 to 1986, annual rainfall in that region ranged between 3,280 and 4,780 mm (129.1 and 188.2 in) per year. Average daily humidity ranged from March lows of between 55 and 81% to July highs of between 94 and 100%, based on readings taken at selected stations nationwide in 1986. About 80% of Bangladesh's rain fall during the monsoon season.[1]



**Figure 3**

## Costal Area Overview

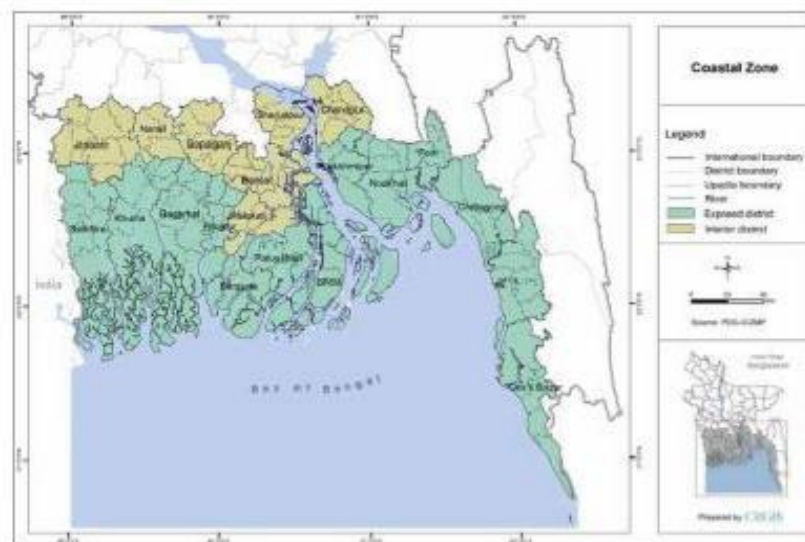
### Coastal Zone of Bangladesh

Bangladesh consists of 19 coastal districts along a coastline of 710 km. The coastal zone (Figure 2.1) extends over 47,150 sq km area and has a population of 38.52 million (BBS 2011). The coastal zone is quite distinct from the rest of the country and has been delineated based on three characteristics, namely the level of tidal fluctuations; salinity condition (both surface and ground water); and risks of cyclone, storm surge and tidal influence. The 19 coastal districts have been further divided into interior (7 districts, 48 upazilas) and exposed (12 districts, 99 upazilas) zones, with regards to distance from the coast or the estuaries, under the Integrated Coastal Zone Management Project (ICZMP) of the Water Resources Planning Organization (WARPO). The zone is characterized by a vast network of rivers and channels, enormous discharge of water with huge amount of sediments, many islands, the Swatch of No Ground (underwater canyon located 45 km south of the Sundarbans in Bangladesh), shallow northern Bay of Bengal, strong tidal influence and wind actions, tropical cyclones and storm surges. [2]

### Topography of the Coastal Zone

The country is located in the Bengal Basin, a low-lying very flat delta. About 80% of it is floodplains, which have very low mean elevation above the sea level. The average elevation of the southwest coastal zone ranges from 1-2 m and in the southeast coastal zone 4-5 m.

The flat topography, active delta, and dynamic morphology play a significant part in its vulnerability to sea level change.[2]



**Figure 4: Delineated Coastal Zone Based on Distance from Sea**

### Geomorphology of the Coastal Zone

Throughout the centuries, the coast of Bangladesh has undergone massive changes due to the dynamic processes of erosion and accretion along the coastline and river estuaries. Based on the hydro-morphological characteristics, the coastal zone has been delineated into three regions: (i) the Ganges Tidal Plain or the Western Coastal Region, (ii) the Meghna Deltaic Plain or the Central Coastal Region and (iii) the Chittagong Coastal Plain or the Eastern Coastal Region (Pramanik, 1983 cited in Islam, 2001; BUET and BIDS, 1993).

The coastal districts covered by these three regions are shown in.[2]

**Physiography of the Coastal Zone**

Bangladesh is covered by 20 physiographic units based on the pattern of agroecology, soil physiographic and climatic factors. Floodplains, terraces and hills are the major physiographic units of Bangladesh. Physiographic unit wise the coastal region can be further subdivided into six sub-regions

The Ganges Tidal Floodplain (saline), the Ganges Tidal Floodplain (non-saline), Meghna River Floodplain, Meghna Estuarine Floodplain (Charland), Chittagong Coastal Plains and St. Martin’s Island.[2]

**FIELD INVESTIGATION AND ANALYSIS**

**Banskhali, Wapda Para, Gondamara Area**

**Map of the Area -01**

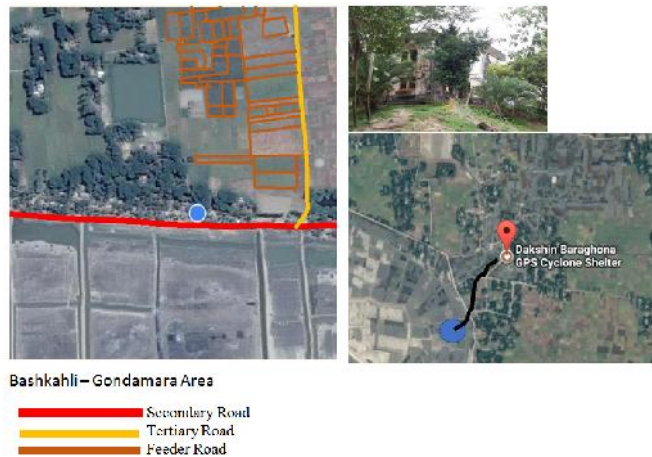
Our survey area was Banskhali, wapda para. This is a coastal area of Bangladesh. This site is an extremely remote area. The people of this area live under the poverty line. There has the scarcity of food, cloth, education. The transportation system is not so well here.



**Figure 5**

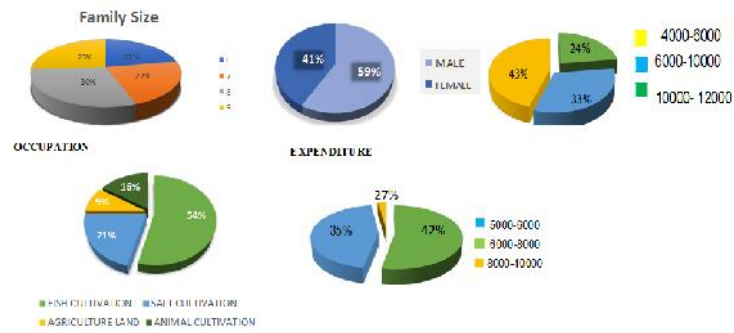
**Road Network**

The distance from Wapda Para to Cyclone Centre is 1.5 Km



**Figure 6**

**Socio –demographic Characteristics**



**Figure 7**

**Type -01**

**House Type: Semi Kacha**

**Location: Banskhali, Gondamara**

The people of this area are very poor. Their main occupation is fishing. In every house, they have a courtyard, which is in front of their house. In this house. Two families are living. Each family has two rooms. They share their kitchen to their bedroom. And the toilet is outside of the house.

**AREA:** 592 sft.

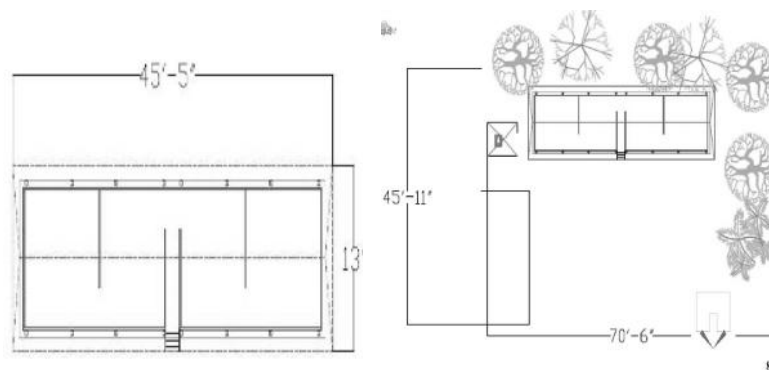
**FAMILY MEMBER:** 10 person

**MATERIALS:** Fence wall,

**Plinth:** Mud, Roof: Tin



**Figure 8**

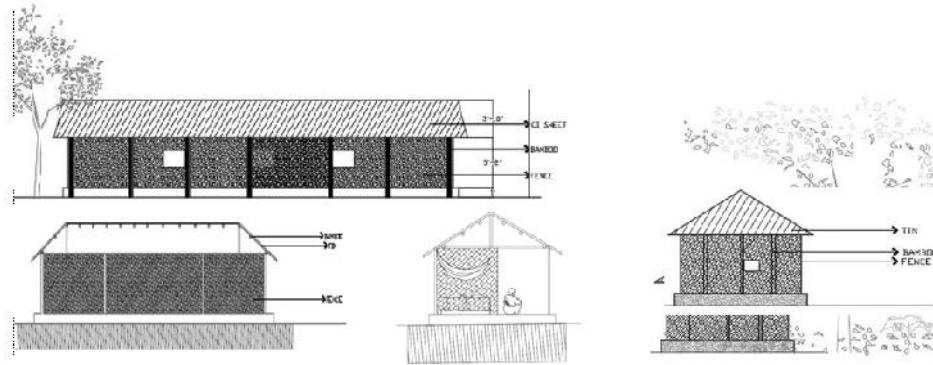


**Figure 9**

**UTILITY:** Water, Electricity

**COST ESTIMATION:** Bansh: 100-300(per piece)

**Tin:** 3500-5000 tk (per ban)



**Figure 10**

**TYPE -02**

**House Type: Kachaghar (Single Family)**

**Area:** 350 sft.

**Family Member:** 6 Person

**Materials:** MUD wall. Plinth: MUD

**Roof:** TIN

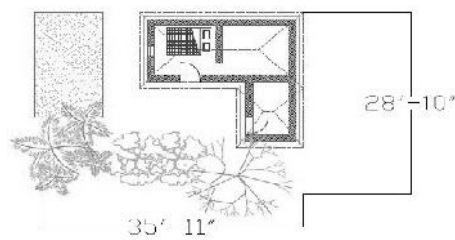
**Utility:** Water, Electricity –SOLAR PANEL

Google Map



**Figure 11**

**Image**



**Figure 12**

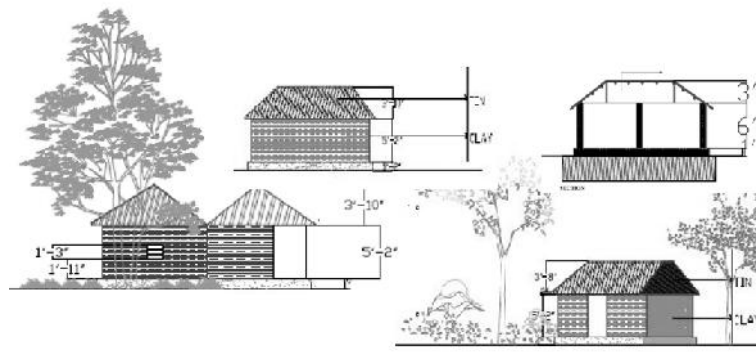


Figure 13

**TYPE -03**

**House Type: KACHA GHAR (DOUBLE FAMILY)**

**Area: 520 sft.**

**Family Member: 18 Person**

**Materials: MUD wall. Plinth: MUD Roof :TIN**

**Utility: Water, Electricity –SOLAR PANEL**

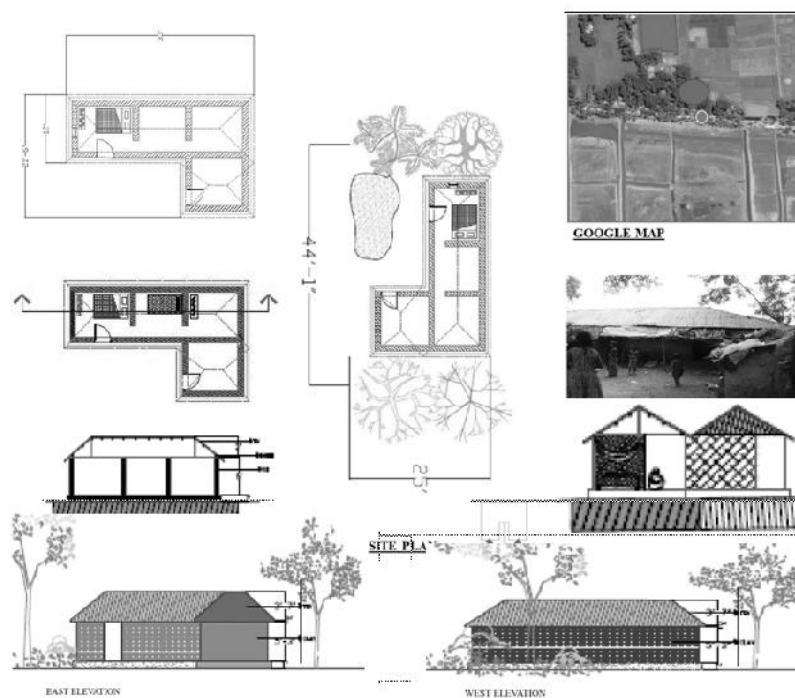


Figure 14

**TYPE -04**

**House Type: KACHA GHAR (DOUBLE FAMILY)**

**Area: 483sft.**

**Family Member: 10 Person**



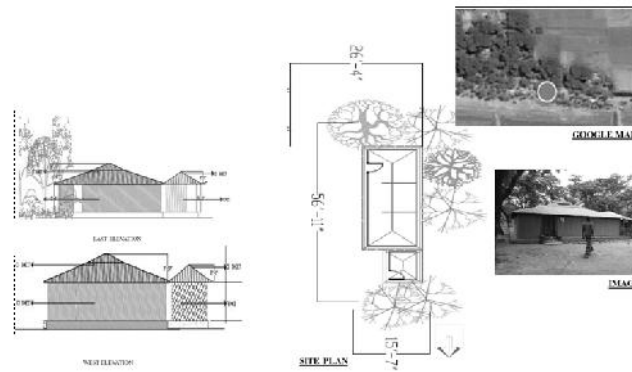
**Materials:** MUD wall.

**Plinth:** MUD

**Roof:** TIN

**Utility:** Water, Electricity –

SOLAR PANEL



**Figure 15**

**TYPE -05**

**House type: KACHA GHAR**

**Area:** 100 sft. Per block)

**Family Member:** 20 family (80 person approximately)

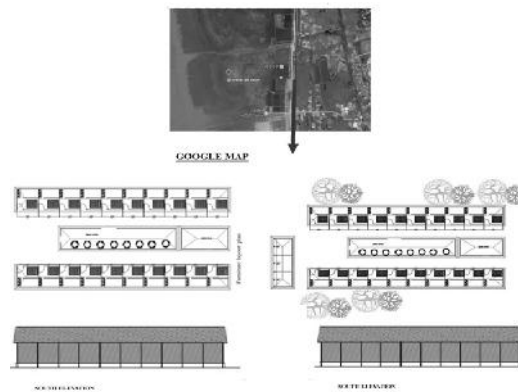
**Materials:** Tin wall. Plinth: MUD Roof : TIN

**Utility:** Water, Electricity

IN THIS AREA THE HOUSING PATTERN IS ALMOST SAME.

MAXIMUM 20 FAMILY LIVE IN ONE COLONY.

- Sharing toilet and kitchen.
- 6 family shares 2 stoves



**Figure 16**

## RECOMMENDATIONS

- A feature that should be considered before selecting sites for constructing house including, overflow zone, Topography, slope and the source of a stream.
- New construction should be planned by considering the construction principles and capabilities of farmer-fisherman's homesteads on the shore.
- The assimilation of a newly-constructed building in such context of the environment should be harmonized the common eminence of coastal space.
- A regular form layout, preferring a rectangle or "L" configuration layout can be supplied.
- The dwelling house should be set linearly to in favor of wind direction
- One unit Small scale well -designed house can be constructed to train local people which naturally become part of the amenity building later.
- The preferred proportions of construction length, width and height, based on the ergonomics, analysis of historical wind path should be measured.
- The building Mud wall should be covered by thin cement layer to protect driving rain, mouse, and another insect.
- Roof shape and material must be improved by modern construction technique considering the chronological forms and availability of material (such as ferrocement sheet as a roofing material and treated bamboo panel as an exterior wall material)

## CONCLUSIONS

A good house is necessary for quality life, but from the field investigation and analysis, it is revealed that the built quality of every house is not only non-engineered and impoverished condition, but also material class is also much dispossessed due to poverty, lack of training and modern technique. In order to enhance the present condition, they should be trained and financed by the local government or social welfare organization. The local material that they used should be improved by modern technique also. A campaign or development program may be taken by any organization that will contribute to creating a better healthy living in a coastal areas.

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