

DETERMINATION OF THE FEASIBLE INTERVENTIONS TO EVALUATE THE DEVELOPMENT AND STRATEGY FOR REDUCING DISASTER RISK IN THE COASTAL AREA OF BANGLADESH

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ABSTRACT

A research work was conducted on quantifying risk reduction interventions to assess the progress and strategies for disaster risk reduction in the coastal areas of Bagerhat, Bangladesh. The study covered four unions, viz. Sharonkhola, which was the worst affected by the cyclone associated with storm surge. Primary and secondary data sources were used in this perspective. Death and damage of properties due to SIDR 2007 had been found to be enormous. Different NGOs and donors gave relief in cash and kinds. Natural and man-made disasters have existing working plans such as wide and raised embankment, saline tolerant trees, improved infrastructure, technology-based warning system, emergency shelter etc. which may be adapted for reduction of disaster risk in the Bagerhat coast in particular. Moreover, the homestead can be protected from cyclone and storm surge by raising fruit and timber trees. A small family can meet up its all basic requirements and expenditure if the area of the homestead is 0.33 acre at the minimum. Such homestead agroforestry system would be able to minimize disaster risk.

Keywords: Calamity, windstorm, storm surges, hazard, riverine

INTRODUCTION

Bangladesh, a small densely populated country is situated in the north-eastern part of the South-Asian sub-continent with the Bay of Bengal in the south. Out of the 4685 km boundary of Bangladesh, the coastline is 710 km long which lies across the Bay of Bengal (Rashid, 1991). However, natural hazards, such as tropical cyclones, floods, storm, storm surges, tornadoes, droughts, and riverbank erosions are very common in Bangladesh. Of these natural hazards, floods, cyclones and droughts are identified as severe problems (Gupta, 1992). There have been years of simultaneous flood and cyclones and occurrence of alternate flood and drought is not uncommon (Ahmed, 1989).

Bangladesh has a tropical and monsoonal climate. The country has four major rivers and hundreds of tributaries from the sub-continent, flowing into the Bay of Bengal. The land is mostly flat and very fertile except the Chittagong Hill Tracts. In low-lying unfertile saline coastal areas and offshore islands, 11 million people live with a high risk of cyclones and storm surges (CPP, 2007 b). In recent years disaster risk reduction has been given importance by international agencies (USAID, 2007). The people, particularly children and women, living in coastal areas, suffer the most when natural hazards strike (Save children, 2007 a, b). During the recent past, Sharonkhola, the southern-most upazilla of Bagerhat had been found to be seriously affected by the SIDR 2007 (CPP, 2007 b). About 30% area of Bangladesh had been found to be affected in which four districts were worst affected (Bagerhat, Borguna, Patuakhali and Pirojpur). Over three thousand people were killed; thousands of people were left with no shelter, crops were ruined and all assets were damaged (Haider, 1991). Natural hazards are difficult to control in the near future (ADB, 1994; USAID, 2007), however, the devastating acts can be reduced through adopting suitable national policies which include the following: (a) awareness among the concerned people (b) ability of the inhabitants to escape or overcome apprehending natural hazard, (c) technical help from the government, international organizations, NGOs etc, (d) modernization of the weather or hazard forecasting system, and (e) improvement of communication and telecommunication

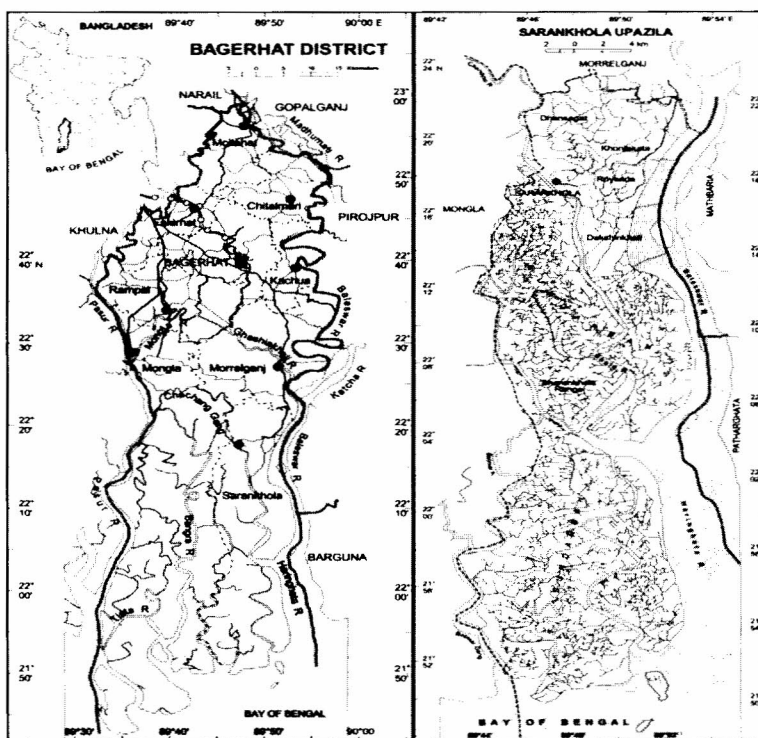
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systems (DMB, 2007). Strategies for disaster risk reduction shall be prepared by the experts in consultation with the people of the locality (BDRCS, 2008; CPP, 2007 a). Lastly, the initial objective of the present investigation was to identify and find out means to reduce the risk hazards as experienced by the people living there and the action taken by the Government of Bangladesh and NGO's who work there as well as the measures taken by them to overcome the hazards and their success in combating the natural hazards. The objective is to quantify the probable interventions to assess the progress and strategies for disaster risk reduction in the west coast of Bangladesh, Bagerhat coast in particular.

METHODOLOGY

Study area

Bagerhat is situated on the west coast of Bangladesh under the division of Khulna. It has a total area of 3959.11 km². It is bounded by Gopalganj and Narail districts on the north, and the Bay of Bengal on the South, while Gopalganj, Pirojpur and Barguna districts stand to the east and Khulna district to the west. Main rivers of the district of Bagerhat are the Panguchi, the Dartana, the Madhumoti, the Pasur, the Haringhata, the Mongla, the Baleswar, the Bangra and the Goshairkhali. The area of the present investigation is the southern-most upazilla of Bagerhat, Sharankhola.



Source: GIS Division, BCA

Fig. 1. Bagerhat district and Sarankhola upazilla of Bangladesh

Bagerhat district has 9 upazillas. These are Bagerhat Sadar, Chitalmari, Fakirhat, Kachua, Mollahat, Mongla, Morrelganj, Rampal and Sharonkhola (Figure 1). It has 77 union parishads, 1031 villages, 687 mouzas, 3 municipalities, 27 wards and 56 mahallas. Sharonkhola upazilla has four unions, namely,

Rayenda, Southkhali, Dhansagor and Khontakata unions. All of these four unions come under the present investigation.

Before the occurrence of the SIDR 2007, there were a few NGO's and humanitarian organizations involved in Sharonkhola pertinent to this matter:

- a. **Prodipon:** Working in alternate livelihood program in the context of climate change
- b. **Muslim aid:** Construction and reconstruction of cyclone shelter, supporting the hazard victims with food, clothing, medicine, sanitation etc.
- c. **Care:** Help in supplying drinking water, sanitation and rehabilitation program
- d. **Rupantor:** Working on public awareness, training, livelihood program, health & sanitation with water purification, rehabilitation
- e. **BRAC:** Working on relief and rehabilitation, pond-sand-filtration, sanitation and cash for work
- f. **Shanta Morium Foundation:** Rehabilitation
- g. **Oggrodot Club:** Water, Sanitation
- h. **CRC (Community Reconstruction Center):** Providing health support

During August 2008, Bagerhat district and 4 unions of Sharonkhola, namely, Rayenda, Southkhali, Dhansagor and Khontakata were visited to know the process that the inhabitants followed. Government officers, chairman and members of local government, cyclone preparation program (CPP), NGO's and their donors at both Sharonkhola and Bagerhat were interviewed. With the help of government officers, chairman/member of union council, as well as CPP and people of NGO's of the unions were met to collect information on how they cope with natural disasters and to provide extra suggestions.

In the present investigation on disaster risk reduction in the coastal area of Bagerhat are synthesized on the basis of the following information, views, comments and reports:

- a. Desire, views and opinion of the inhabitants of 4 unions of Sharonkhola upazilla of Bagerhat, namely, Southkhali, Rayenda, Dhansagor and Khontakata.
- b. Views of 20 selected contact persons in Sharonkhola and Bagerhat.
- c. Information on concerned subject given by government officers working in Sharonkhola as well as chairman/member of 4 union councils of Sharonkhola.
- d. Views and comments on the concerned subject of CPP and NGOs.
- e. Periodicals, final-, special and annual reports of NGOs CPP, donor agencies/organizations on the concern or related subjects.
- f. Scientific papers and reports, review papers on concerned subjects as received from different libraries and internet.

RESULTS AND DISCUSSION

Results are presented under two major sub-heads, natural disasters on the west coast of Bangladesh and man-made disasters around Sharonkhola. Some of the findings are discussed with references to the previous work and reports.

Natural disasters on the west coast of Bangladesh

Almost all type of natural disasters occur in Bangladesh including its coastal areas. Natural disasters may be a bit less on the west coast as compared to the central and east coasts due to the presence of the Sundarban. Disasters that normally occur in the west coast, central and eastern coastal regions are cyclones, tornado, storm surge, floods and river erosion.

Cyclone and storm surges: The severest cyclone occurred on 15th November 2007 known as 'Doomsday' hit the coastal area of Bangladesh with a maximum speed of 250 km/hr along with the 25 ft high storm surge. Out of 64 districts of Bangladesh, 18 districts were badly affected. These were Barishal, Patuakhali, Chadpur, Faridpur, Narayanganj, Noakhali, Sariatpur and Munsiganj. Within 18 districts, 4 districts were the worst affected. These are Barguna, Bagerhat, Patuakhali and Pirojpur (Figure 2 and 3).

In the 18 affected districts, death: 3,185, Injured: 34,694, number of families: 15,05285, number of homesteads damaged: 12,074,10 and damage of crops: 16,58,398 acres. In Bagerhat, the loss of life and damage of properties had been found to be enormous which clearly state the following facts. Number of affected families: 2,33,024, number of death: 763 persons, no. of people injured: 89,565, no. of houses damaged: 2,44,232 and crop damaged: 1,03,352 acres. It may be noted here that out of the total deaths of 3,185 people in the 18 districts, the highest no. of death was 1,269 in Barguna, and the second highest was 763 in Bagerhat. Damage to properties was also very high in Bagerhat.

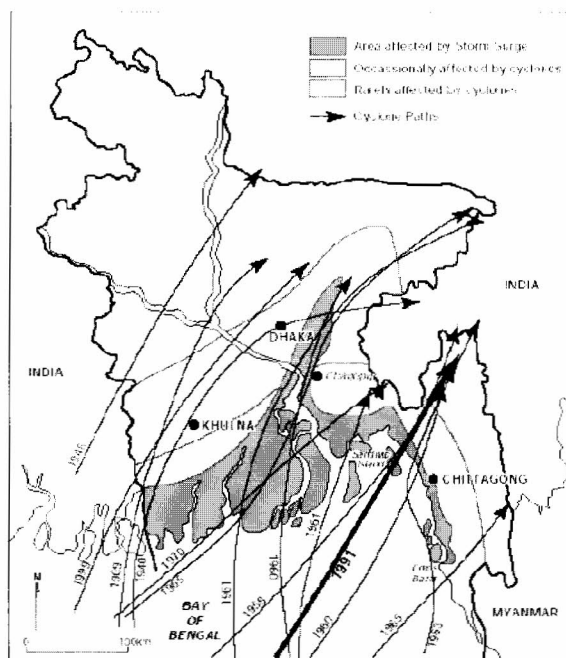


Fig. 2. Areas affected by tropical cyclones and storm surges in the coastal regions of Bangladesh

Cyclones occur mostly during pre-monsoon (April to May) and post-monsoon (September to December) periods. These cyclones cause serious destruction. The cyclones do severe damages in Bangladesh. This is because of the low flat terrain, high density of population and poorly built houses. Most of the damages occur in the coastal regions of Khulna, Patuakhali, Barisal, Noakhali, Chittagong, Cox's Bazar and the offshore islands like Bhola, Hatia, Sandwip, Monpura, Kutubdia, Maheshkhali, Nijhum Dwip, Urir Char and other islands or chars (Islam, 2005 a, b & c).

In the cyclone SIDR 2007, the number of fully affected houses was 4,584 in Southkhali, 1984 in Dhansagor, 314 in Khontakata and 3,654 in Rayenda. So, in total 13,327 houses were fully affected in 4 unions of Sharonkhola. According to that report, the number of affected unions: 4, number of affected families: 21,125, number of people died: 695, number of the fully affected house: 13,464, fully damaged crop: 6,700 ha, fully affected embankment: 15 km. etc. It is assumed that the damage of houses in 9 upazillas of Bagerhat is 2,44,232 and then the average damage of houses per each upazilla was 27,136. So, it is predicted that the damage of houses in Sharonkhola may be in between 13,000-14,000. By this time 2,928 new houses were handed over to them.

Information on cyclone SIDR 2007 reports are available from a number of NGO's (BDRCS, 2008: CPP, 2007 a, b; Save children, 2007 a, b).

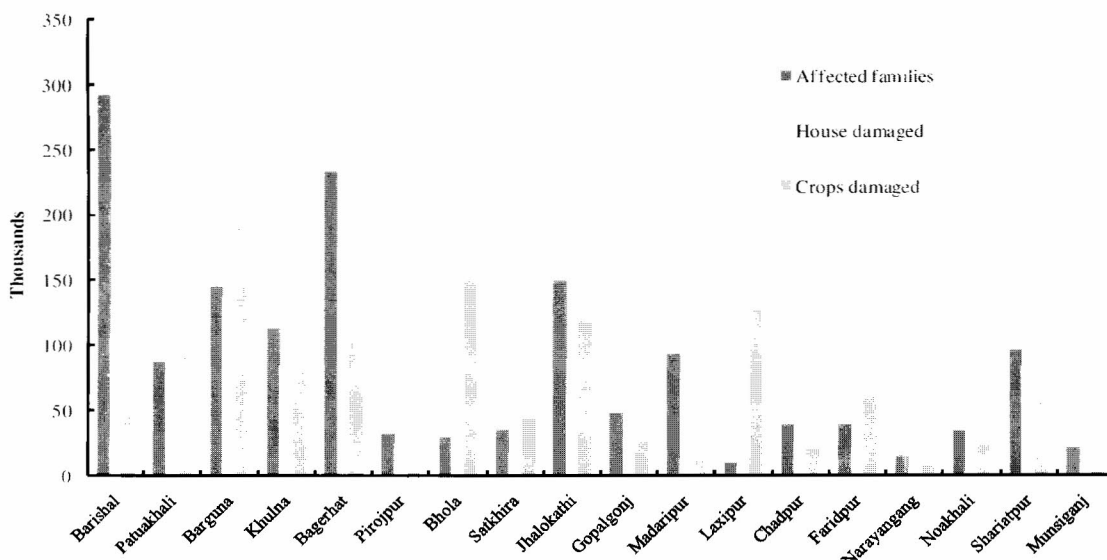


Fig. 3. Damage caused by the cyclone SIDR in the 18 districts of the southern part of Bangladesh in 2007

On the loss of life and damage of different properties, no symmetry or conformity of results could be established among the reports. In between two reports, 30-50% variations are not uncommon. Moreover, not a single report on the total devastating activities of SIDR 2007 along the entire coastal area of Bangladesh has yet made available.

Along with/immediately after the SIDR, there was a tremendous storm surge. The height of the storm surge was as high as 25 ft as opined by local people and NGO's. Other cyclones occurred in the west coast were not very serious for Sharonkhola. Moreover, there were fewer NGO's in Sharonkhola before the occurrence of the cyclone SIDR 2007. The cyclone of 1991 and 1997 did not hit Sharonkhola rather did severe most damage to Chittagong, Khepupara, Kutubdia, Cox's Bazar and Monpura, Bhola, and Shandwip. The death of people was 1,38,000 (Choudhury, 2001; Choudhury *et al.*, 1998). The same cyclone hit Bagerhat and other parts of the west coast.

Other disasters like tornado, storm, flood and erosion: Due to the presence of the Sundarban along with the Southern part of Sharonkhola, the magnitude of cyclonic storm wind and storm surge used to fall down and, as such, Sharonkhola and its northern side are not subjected to devastation or at least serious devastation.

Man-made disasters

Number serious man-made disaster has been reported for Sharonkhola. The southern part of the upazilla is protected from natural hazard by the Sundarbans while the other three sides are protected by embankments. Saline water enters into Sharonkhola through its southern part by the way of a storm surge. Pucca roads (concrete roads) are sufficiently raised while the kacha (earthen roads) are not and due to heavy rain or storm surge, the low-lying areas are inundated. Under the cover of darkness, poor inhabitants cut down trees in the disaster protecting belt which enhances the disaster. The local people, however, resist such acts. Number of major disasters are caused by the activities of the local people of Sharonkhola.

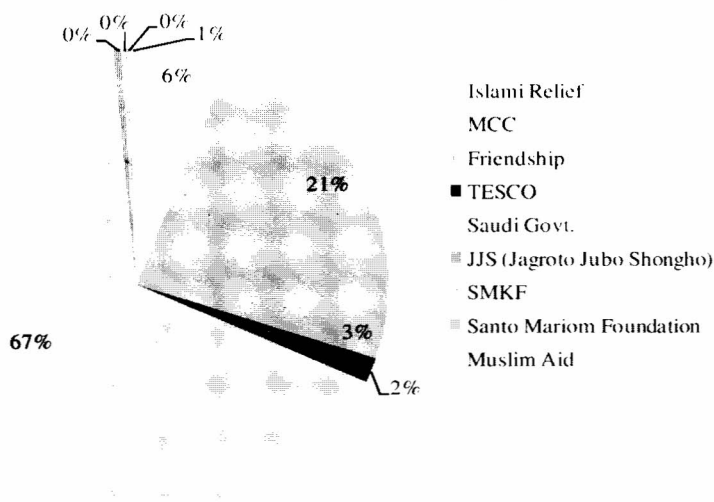
Support of Government Organization, NGO and other organizations towards the coastal inhabitants

After the devastating act of SIDR cyclone of 2007, many NGO's, relevant bodies of the Government of Bangladesh and international organizations, aid-giving agencies, donors and other humanitarian societies have come to Sharonkhola with the view to help the disaster victims.

CPP and GOB: The CPP is an autonomous body under the government of Bangladesh. In July 1973, CPP was formed as a joint venture between the Govt. of Bangladesh (GOB) and the Bangladesh Red Crescent Society. Sometimes it works with one or more NGO's. It also takes responsibility of works assigned by the Government of Bangladesh (GOB) or any other national or international finance. Other agencies also donated various items which were distributed by a number of NGO's (Figure 4).

CPP: Through operational method, CPP Dhaka receives special weather bulletins on cyclone warning signals from the Bangladesh Meteorological Department (BMD). CPP plays a crucial role in the dissemination of cyclone warnings, evacuation, rescue, first aid and emergency relief work through its volunteers in the coastal districts and via radio communication facilities. Public awareness is an integral and very important part for the CPP and its successful implementation. Keeping this in view, CPP implements the following public awareness activities: public awareness through volunteers, cyclone drills and demonstrations, film/video and the films and publications department of the Government, publicity campaign and radio and television etc.

No. of houses constructed/donated by NGO



Information source: PIO, Sharonkhola

Fig. 4. Showing houses and other items donated by donors and distributed by NGO's

Muslim Aid: Muslim Aid Bangladesh was found by donors ECHO, UMCOR, Reuter-Germany, Deniz Feneri-Turkey, ECHO-USA, Muslim Aid Australia, Muslim Helfen-Germany and Global Medic-Canada. They gave food, water, utensils, health care, warm clothes, supportive inputs for education, shelter, livelihood, cash for work and sanitary latrines. Activities of Muslim Aid are relief operation, sanitation, agriculture, emergency shelter for victims, beneficiary selection etc.

BRAC: In considering cash for the work project provided by BRAC, 90% of females are allocated for this project which contains Tk. 50,000,00. Activities of BRAC include emergency food and money, Hygiene and sanitation funded by DFID and USAID, house reconstruction funded by DFID, ongoing cyclone shelter making at Southkhali and Tafalbari union with a budget of Tk. 2 crore/per shelter and also on some criteria; BRAC, gave help through cash.

CARE: In response to the SIDR 2007, CARE Bangladesh worked with Govt. NGO's and other bodies to assist vulnerable cyclone-affected populations. CARE worked in two districts, Bagerhat and Borguna, distributing food and non-food items as well as water, sanitation, shelter, housing etc. PRODIPAN, RIC, SHAPLAFUL, UTTARAN, RDF, CODEK, SAP-BD etc. were the main financiers

of CARE at its SIDR 2007 program. In Sharonkhola, CARE carried out different relief works which included emergency food supply, emergency health support, rehabilitation, educational support, health care, cyclone shelter and housing. Other activities of CARE in Sharonkhola were: livelihood, sanitation, rehabilitation and shelter, training oriented workshop etc.

Disaster risk reduction in the coastal area of Bagerhat: About 30% of the people in the country live in the coastal area and offshore islands. However, various measures have been applied to reduce the devastating activities of almost all natural hazards (Hoque, 1992; Nizamuddin, 2001). A national policy on disaster risk reduction shall be adopted for the entire coastal regions of the country but the working plan for the different location will be different in consideration to its geographical, physio-environmental, socio-environmental and infrastructural conditions.

Policy and principle of disaster risk reduction in the coastal region: The following policies and principles may be adopted:

- a) Adequately raised and wide embankment shall be constructed with compressed soil along the shore so that the saline water of normal storm surge or tidal surge, etc. cannot penetrate on the inside.
- b) The tree belt will not only protect the embankment but will also protect people along with their properties and domestic animals.
- c) Highly raised cemented roads shall be constructed with connection to all important places.
- d) Dwelling houses should be made; Pucca/Semi Pucca (concrete/sub-concrete roads) should be built on raised land so as to withstand strong wind and surge water.
- e) Cyclone shelter center, medical center, police station, etc. should be constructed in human locality or nearby so that in case of emergency people can take shelter to their desired places.
- f) Emergency livestock parks may be established in a raised place near human locality. The park may be encircled by embankments and local trees with outlet for waters in such a way that the cattle cannot get out of it and there is no inundation inside the park.
- g) Modern early warning system may be established. People may be informed with siren and radio as regular intervals about the probable hazard well ahead so that they can take safe shelter.
- h) Transport and communication should be modernized so that life of people may be saved.

Strategies for disaster risk in the coastal area of Bagerhat

The southern part of Sharonkhola is the constituent part of the Sundarban known as the Sharonkhola range. Occurrence, frequency, intensity and magnitude of some common natural hazards like cyclone, tornados, storm-surge, tidal surge, etc. may be reduced if the following steps/measures are taken:

- a) **Construction of embankment and rising of tree belts:** wide and raised embankment should be constructed along the entire shore of Bagerhat except the southern part of Southkhali where the natural barrier, the Sharonkhola range is situated.
- b) **Development of infrastructures and public places:** Roads should be raised, cemented and connected to important public places (medical center, police stations, cyclone shelters etc.) All of these organizations should be established by the sides of the roads, so that people can reach their desired places. Arrangement should also be in terms of river transportation for the devastating zones.
- c) **Early and accurate warning system:** Early and accurate warning systems should be established so that people can get accurate and authentic information about upcoming hazards.
- d) **Selection of habitable area and establishment of emergency cattle park:** A cattle park may be established near human habitable areas and should be situated on raised land surrounded by a strong fence of trees.
- e) **Income from homestead:** Using the principles of agroforestry, production of vegetables and fruits, fattening of calves, dairy products, poultry, ducks etc. can be successfully done in homestead areas. Moreover, homestead can be protected from storms, cyclones etc. by raising fruit and timber trees. A family of 4-5 members can meet up its basic requirements if the area of the homestead is 0.33 acre.

CONCLUSION

A national policy on disaster risk reduction shall be adopted for the entire coastal regions of the country but the working plan for different locations will be made based on its geographical and environmental conditions. Measures that can be taken include construction of embankment and rising of tree belts, development of infrastructures, accurate warning systems, selection of human habitable areas and establishment of emergency cattle park and the income from homestead areas. The following working plans may also be adapted: sufficiently wide and raised embankment on the inner slope and inner side of the embankment, saline tolerant trees shall be planted and protected, raised and cemented roads should connect to public places, accurate modern warning systems shall be installed in important places to aware the inhabitants, human-habitable houses and emergency cattle parks should be made on raised land and trees, vegetable etc. may also be produced in homestead areas.

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