Social and economic dimensions of the 1998 extreme floods in coastal Chiapas, Mexico

ALVARO SANCHEZ-CRISPIN & ENRIQUE PROPIN-FREJOMIL
Institute of Geography, National University of Mexico, Mexico City 04510, Mexico
e-mail: ascrispin@yahoo.com; epfrejomi@yahoo.com

Abstract Based on empirical research, this paper examines some of the social and economic consequences of the extreme floods that affected the Pacific seaboard of Chiapas, Mexico, during the first few days of September 1998. A tropical region of 10 000 km$^2$ was flooded, which affected over 800 000 people living in sparsely-populated rural communities and a handful of small and medium-size cities. Due to this natural disaster, over one thousand people were reported dead or missing, land communications were severely damaged and the regional economy was disrupted. One of the major findings of this study is that the extreme flooding was not followed by a massive abandonment of the area; on the contrary, the local population wanted to remain in their original places of residence, participating in actions aimed to reduce the effects of the disaster and waiting for external aid to arrive, particularly governmental assistance.

Key words natural disasters; extreme floods; Mexico, coastal Chiapas

INTRODUCTION

The worst natural disaster in Mexico, after the 1985 Mexico City earthquake, was produced by the 1998 extraordinary floods in coastal Chiapas. Early in 1999, the Mexican government, through its National Water Commission, funded a research project lead by the Institute of Geography of the National University of Mexico (UNAM), looking thoroughly at the aftermath of the disaster. This paper presents some of the results of that study.

The coast of Chiapas is a narrow strip between the Sierra Madre de Chiapas and the Pacific Ocean, oriented northwest–southeast, 250 km long and 30 km wide; the eastern and western limits match the political borders of Chiapas with Guatemala and the state of Oaxaca, respectively (Fig. 1). This area is important to the Mexican economy in terms of its contribution to the annual output of export crops, basically coffee and tropical fruits, and plays a strategic role in foreign relations since thousands of illegal workers from neighbouring Central America enter the country through this region. The number of people living along the coast represents one-quarter of the state total of 3.5 million; the commercial–agriculture and tertiary sector-oriented economy spins around Tapachula, the largest city in Chiapas, with over 200 000 inhabitants. In spite of its rich economy, the area is socially marginal and poor within the Mexican context (CONAPO, 1993).

For four days (7–10 September 1998) tropical storm Javier produced heavy rains totalling 1000 mm in coastal Chiapas, with a maximum single event of 350 mm, on 9 September. Due to this situation 36 small river basins overflowed causing extreme
Relevant features
I. Socio-economic
• Questionnaire places
  • Main road

II. Natural
- Rivers

Regional geographic features
I. General
Area: 11,439.3 sq. km.
Human settlements: 5,002
Municipalities: 22

II. Thematic
Social marginality: high
Population density*: 37.6 (1970); 74.6 (1995)
Settlement density**: 0.13 (1970); 0.44 (1995)
  * Inhabitants per sq. km.
  ** Settlements per sq. km.

III. Questionnaire information
Number of interviews: 1,020
Number of settlements: 99

Source: CONAPO (1992); INEGI (1997)
and field work data.

Authors: Sanchez, A.; Pizano, E.

Fig. 1 Map of the coast of Chiapas showing the flooded areas and the distribution of sites used for the questionnaire.
floods in the coastal plain as well as in the hills, contributing to the destruction of many rural and urban settlements (with a sizeable death toll), disrupting the regional economy and hampering land transportation and agricultural production. In the last two decades, three situations have largely contributed to the generation of such a disaster:

- rapid land-use changes in the region, basically from natural vegetation to agriculture and pastures;
- heavy logging in the Sierra leading to total deforestation in particular areas and
- the ever growing number of small settlements in coastal Chiapas.

DATA

Areas hit by flooding

The flooded areas in coastal Chiapas were determined at the Institute of Geography, UNAM, after the processing and interpretation of two Landsat TM-5 images (bands 4 and 5) and one radar image, all from 13 September 1998. These images, taken just after the disaster, show the maximum extent of the 1998 floods.

Questionnaire survey

Questionnaire-based research was carried out from February to April 1999. Several field work sessions were necessary to complete 1020 interviews in 99 settlements distributed over the study area (Fig. 1). The questionnaire was made up of 18 general entries that examined local opinions concerning three basic situations disrupted by the floods:

- the quality of life in the region,
- the sense of belonging to this part of Mexico, and
- the perception of regional problems.

Since this research was done after the floods and data gathering came directly from the worst affected population, key issues regarding the influence of this natural disaster on the continuity of the regional livelihood and economy were adequately dealt with.

METHOD

A semi-structured interview approach was followed in order to get the questionnaire responses. This included open-ended and closed questions that shed some light on the apprehension of the reality by the locals regarding extreme flooding. Places suitable for the survey were selected according to the geographical distribution of the population in the region; the locations of the settlements worst affected by flooding determined by a comprehensive map and newspaper review, and the presence of urban conurbations fundamental to the regional economy.

Digital imaging of the coast of Chiapas representing every surveyed settlement and the respective computer-processed information was performed at the Institute of
Geography and followed by the production of relevant maps. Qualitative survey information was classified according to the answers given by the interviewees and grouped in single categories that allowed graphic production.

### a. Socio-regional dynamics

<table>
<thead>
<tr>
<th>Place of origin</th>
<th>Migration periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town</td>
<td>1950</td>
</tr>
<tr>
<td>Another town, same region 1950-1970</td>
<td></td>
</tr>
<tr>
<td>Chiapas</td>
<td>1971-1990</td>
</tr>
<tr>
<td>Mexico</td>
<td>1991-1999</td>
</tr>
<tr>
<td>Abroad</td>
<td></td>
</tr>
</tbody>
</table>

#### I. Place of origin
- Town
- Another town, same region
- Chiapas
- Mexico
- Abroad

#### II. Migration periods
- 1950
- 1951-1970
- 1971-1990
- 1991-1999

### b. Regional attachment

<table>
<thead>
<tr>
<th>Potential migration</th>
<th>Potential capital investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locals do not want to move</td>
<td>In town</td>
</tr>
<tr>
<td>Locals want to move</td>
<td>In another town, same municipality</td>
</tr>
<tr>
<td>In another town, same region</td>
<td>In Chiapas</td>
</tr>
<tr>
<td>In Chiapas</td>
<td>In Mexico</td>
</tr>
<tr>
<td>Abroad</td>
<td>Abroad</td>
</tr>
</tbody>
</table>

#### I. Potential migration
- Locals do not want to move
- Locals want to move

#### II. Potential capital investment
- In town
- In another town, same municipality
- In Chiapas
- In Mexico
- Abroad

### c. Population's perception of regional problems

<table>
<thead>
<tr>
<th>Problems strongly contributing to flooding</th>
<th>People's attitude to regional problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and livestock in inadequate areas</td>
<td>Active</td>
</tr>
<tr>
<td>Insufficient engineering works</td>
<td>Locals can solve their own problems</td>
</tr>
<tr>
<td>Water supply and sewage in bad conditions</td>
<td>Locals can solve problems with external aid</td>
</tr>
<tr>
<td>Settlement dispersion</td>
<td>Passive</td>
</tr>
<tr>
<td>Other</td>
<td>External aid and local support will solve regional problems</td>
</tr>
</tbody>
</table>

#### I. Problems strongly contributing to flooding
- Agriculture and livestock in inadequate areas
- Insufficient engineering works
- Water supply and sewage in bad conditions
- Settlement dispersion
- Other

#### II. People's attitude to regional problems
- Active
- Passive
- None

#### III. Type of actions locals may take to cope with flooding
- Active
- Passive
- None

#### IV. Situations unlikely to be solved by locals, regarding
- Infrastructure
- Organization
- Both
- None

*Fig. 2 Selected results of the questionnaire survey undertaken February-April 1999.*
RESULTS

Socio-regional dynamics

Native people represent the largest segment of the population in coastal Chiapas; however, for more than 30 years, this region has attracted a significant number of migrants, mainly from Guatemala and El Salvador; with the largest immigration flows taking place in 1970-1990 (Fig. 2(a)). Throughout the 1990s, an intense intra-regional migration was detected, particularly within the rural areas, which has resulted in a rapid expansion of the humanized frontier in this part of Mexico.

Regional attachment

In the aftermath of the floods four-fifths of the interviewees want to remain in the same place where they lived when the disaster occurred. Those willing to move wanted to relocate in the same area, preferably into urban locations, even if these had also been affected by the floods. In terms of migration, the existing image of many coastal communities was not altered by this natural disaster. With regard to potential monetary investment, more than one-half of the respondents wanted to establish their own business (general stores, restaurants, services, etc.) in the region, particularly in Tapachula and other smaller urban centres (Fig. 2(b)). In summary, we did not find any evidence to suggest that the extreme flooding had significantly influenced the perspective of the local population on where they wanted to live. Accordingly, it is safe to assume that this natural disaster did not change their sense of attachment to the region.

Perception of regional problems

According to our survey, the lack of adequate engineering works and the bad operating conditions of the regional water and sewage system strongly contributed to worsening the after effects of this natural disaster. In this respect, other problems mentioned by the interviewees have to do with the geographical dispersion of human settlements in the area and the presence of agriculture, livestock and forestry in fragile places on both the plains and the Sierra (Fig. 2(c)). Over three-quarters of the respondents were willing to actively participate in state-regulated activities aimed at alleviating some of the problems associated with flooding. As in many other areas of the world affected by this kind of natural hazard (Wijkman & Timberlake, 1984), the people of the coast of Chiapas wanted to remain in the area, adopting a positive attitude towards the solution of local problems, expecting and demanding reliable aid in the form of new housing projects and financial assistance from federal authorities. Nearly 66% of the interviewees affirmed that emergency actions by the locals alone cannot cope with the provision of water-supply infrastructure and the repairing of roads, bridges and the embankments of rivers, all of which are considered government's responsibility.

All in all, the 1998 Chiapas flooding did not trigger a massive migration out of the region and government-led actions, particularly with respect to people's relocation and
the provision of physical infrastructure, were seen by locals as essential to mitigate the problems brought about by the 1998 disaster. A year and a half after the floods, those requirements had not been fully met by the Mexican authorities responsible for their provision.

Socio-economic studies of the consequences of natural hazards can be fully appreciated in terms of the political management of such disasters, which in the case of Mexico has multiple implications, from party propaganda to international recognition and support. Many flood-prone areas in the country, Acapulco in 1997, the coast of Chiapas in 1998, and eastern Mexico in 1999, are socially marginal and poor, and this kind of research becomes essential in the rearrangement of the already fragile relationships between the local population and the environment, as people’s opinions and feelings, regarding natural disasters in particular and their natural surroundings in general, are taken into account. In view of this, coastal Chiapas should be granted the status of a priority region, by the Mexican government, within the context of a Regional Program of Natural Resources Management, aimed at regulating efficient federal action to prevent and relieve the effects of natural hazards in the area.

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REFERENCES


