

## HURRICANE RESPONSE AND HURRICANE PERCEPTION IN THE COMMONWEALTH OF THE BAHAMAS [1]

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### INTRODUCTION

The Commonwealth of the Bahamas, though distinctly influenced culturally and economically by proximity to the United States, cannot divorce itself from its Caribbean neighbours. Historically, of course, there are similarities between the Bahamas archipelago and the more literal Caribbean islands – British colonization, the transference of English parliamentary institutions, slavery and emancipation, and post-emancipation economic decline – and yet equally significant differences such as the evolution, in the Bahamas, of a predominantly maritime economy and the benefits accruing from a strategic position vis-à-vis the United States (Lewis, G.K., 1969). The Bahamas, thus, displays a hybrid quality revealed in economic and cultural paradoxes. Nevertheless, factors exist, as in any conveniently defined “region”, which transcend politico-historic influences and differences within the Caribbean and its fringes. Among these factors, natural phenomena figure prominently and of these, none is so violent in expression as the hurricane. Hurricanes affect most of the Caribbean islands together with its Atlantic perimeter – the Bahamas and Bermuda – and the southern coastline of the United States and Central America.

The ferocity of the Caribbean hurricane is well known and well documented:

“A tropical Caribbean hurricane can destroy a whole city, like Belize in 1931, in a matter of a few hours; or shatter an island economy, like the pulverization of the Puerto Rican highland coffee industry in 1899 or of the Grenada nutmeg industry in 1955; or level every building, private or public, if the victims be, like Anguilla or Anageda, small, flat islets utterly defenceless against its onslaught” (Lewis, G.K., 1969).

But just as the Bahamas itself is situated, in a cultural-economic sense, on the periphery of the Caribbean region, so its vulnerability to hurricane strikes is somewhat peripheral. This is not to say that the hurricane threat is unimportant. A significant observable feature of hurricanes in the Caribbean is their unpredictability. Hurricane tracks can be generalized from available data but the idiosyncracies of individual storms make the threat omnipresent.

The Commonwealth of the Bahamas, however, consisting as it does of some thirty inhabited islands and myriads of small cays spread over five hundred miles of the Atlantic Ocean to the south-east of Florida, has never suffered the devastation of a Belize or a Puerto Rico. Few lives have been lost and damage has been slight by comparison. Of the forty-one

hurricanes recorded between 1878 and 1971 that have passed over or adjacent to the Bahamas, few have actually caused significant damage (Lewis, J., 1975). Only a small number of hurricanes at the peak of their ferocity have passed directly over the Bahamas and damage from individual storms has been reserved for one or two principal islands rather than for the archipelago as a whole.

It is against this background that social response and perception of the hurricane threat in the Bahamas can be observed. Such response and perception is obviously governed by the frequency of occurrence and the degree of personal experience. With this frequency and experience spasmodic, awareness of the threat and the ability to counter the threat are more likely to be coloured by legend, hearsay and public information. Despite the infrequency of actual hurricanes, defined more closely as tropical storms with wind speeds of greater than sixty-three knots, storms of lesser intensity are also of great importance to the awareness of the Bahamian people. Topographically, the Bahama islands are extremely flat; nowhere does the land surface rise above 206 feet. Many settlements are, consequently, barely above sea level and, with a general lack of substantial vegetation cover, are exposed to low-intensity climatic vagaries. The assumption is that in many cases hurricanes imply storms of lower intensity if the response is based upon personal recall; the hurricane experience of many Bahamians is limited to legends from older members of family and kin groups. In any discussion of the perception of the hurricane threat in the Bahamas this lack of accurate or unambiguous information must be deemed a vital factor. This factor of itself, in individual terms, may not be a significant problem. However, in terms of public education and community hurricane preparedness, correct information becomes an important issue. Any attempt to assess the degree of per-

ception of the hurricane threat in the Bahamas must realise that much of what appears to be experience-derived information is, in fact, legend-derived or derived from experiences with storms of lower intensity than officially-defined hurricanes. Nevertheless, the implication by association is that storms of lower intensity contain somewhat similar properties to hurricanes and may effect damage related to that described in hurricane legends, although on a smaller scale. This would be expected to hold some truth on the local level given the topographic qualities of much of the Bahamas archipelago.

The Bahamians, thus, assess the hurricane threat in terms of environment, experience and folklore. Theirs, like that of all societies, is a unique response differing, as in many other ways, from a truly Caribbean assessment where experience and frequency of hurricane occurrence would appear to play a larger role and where the natural environment contains considerably greater variation (Lewis, G.K., 1969).

#### AIMS AND METHODS OF ANALYSIS

Originally the aim of an analysis of individual hurricane perception and awareness in the Bahamas was to test responses to potential hurricane watch/warnings, hurricane strikes and accompanying injury and damage, by testing previous experience, if any, together with any personal projections of attitudes to future events. It was hoped, also, to test the efficiency of current public information services and the suitability of this information for each personal situation.

A questionnaire was devised with a firm but flexible structure to allow the maximum amount of desired information to be elicited comfortably. The questionnaire was divided into four principle sections concerning basic socioeconomic data, previous hurricane exper-

ience, potential future response to a hurricane strike, and perception of the hurricane phenomenon and the damage it may cause [2]. The analysis was based on a random point sample of 0.01 percent of the population of the Commonwealth of the Bahamas current at the 1970 census (168,000). Careful division of survey application between various islands in the archipelago was necessitated by, for example, the presence of New Providence Island containing the capital Nassau, towards which the majority of the population was weighted. Approximately sixty percent of the Commonwealth's population resided on New Providence and consequently sixty percent of the survey was undertaken in Nassau and its immediate hinterland. Of the remainder, it was felt imperative to reflect the differing economic and environmental dimensions of the remaining inhabited islands. Seven islands were, therefore, selected as being representative of the socio-economic conditions not reflected by New Providence. The seven "Family Islands" selected were Abaco, Andros, Eleuthera, Exuma, Inagua and San Salvador.

The original aims of the questionnaire were, to a great extent, satisfied; awareness of existing warning facilities was adequately tested together with individual response to an experienced hurricane strike. A detailed impression of the perceptual depth and capabilities of individuals with no experience of hurricane activity was gained from the survey results. However, it was found difficult to establish the degree of folk-myth present in the response of individuals with no previous hurricane experience. Likewise, an inevitable inability to determine the degree of community environment influence upon individual responses emerged. These difficulties were due, in significant part, to the structure of the questionnaire which made no attempt to make a detailed examination of community response. Nevertheless, the questionnaire did make a useful contribution to an understanding of

individual response to the hurricane threat in the Bahamas from which a degree of community response can be pieced together.

### THE HURRICANE EXPERIENCE

Two-thirds of all respondents claimed to have experienced a hurricane in their present locality. This figure, in the light of the above discussion, is almost certainly an over-exaggeration. Within the present century only one major hurricane affected a substantial part of the archipelago and that occurred in 1929. Other hurricanes have passed close to the Bahamas and some have certainly passed peripherally over part of the Commonwealth. Yet, other than in 1929, the full force of a hurricane has never been experienced in the Bahamas apart from occasional experiences by individual islands such as Abaco Island's brush with hurricane "Betsy" in 1965. The claimed hurricane experience, therefore, does not necessarily emanate from full-force hurricanes but from other strong, damage-causing storms, from superficial interaction with hurricane perimeters, or from a mixture of these factors spiced with legends probably associated with the 1929 hurricane. Nevertheless, and especially among younger respondents, superficial interaction with passing hurricanes implies, to all intents and purposes, actual hurricane experience because of the amount of warning and other information available via the media for interpretation during the threat phase. Certainly a potential hurricane strike in the Bahamas is often the cause of great excitement because of its comparative rarity. Relatively unique events of this kind, even if the hurricane passes, result in vivid and often embellished mental retention. The fact that individuals merely take part in a watch-and-warning situation and associated preparation activities may be enough to mentally translate the response into actual hurricane experience.

Specification of the actual number of hur-

ricanes experienced produced responses alluding to one experience (hurricane “Betsy” in 1965 or the 1929 hurricane among older respondents) or two experiences, the latter referring most frequently to combinations of “Betsy” and hurricane “Donna” – which passed over the Bahamas in 1960 – or “Betsy” and the 1929 hurricane among older respondents. Non-committal responses, principally the response “many” delivered by one-fifth of all respondents, indicated an inability to distinguish between actual hurricane experience and experience with other storm activity.

Similarly, delimitation of the year in which the last hurricane occurred produced varied responses over and above the expected fifty percent of respondents who gave 1965, the year of hurricane “Betsy”, the last major hurricane to affect the Bahamas. Some also offered 1960, the year of “Donna”, while older respondents retained vivid memories of 1929. The fact that older respondents offered 1929 rather than 1965 gives some indication of the ferocity of the 1929 hurricane compared with “Betsy”. Other submitted dates, principally the years 1969 through 1974, contained no reported hurricane activity. Many of these responses came from inhabitants of the Family Islands like Andros with its exposed, low-lying coastal settlements. Andros residents reported that flooding was frequently a problem, a fact not necessarily requiring hurricane-force storm activity.

### Damage

Reported damage in a respondent’s locality during the last experienced hurricane varied predictably between New Providence and the Family Islands. The significant difference in the amount of tree damage reflected areal extent and different uses of vegetation. Nearly three-quarters of all respondents from New Providence expressed tree damage as the prin-

cipal damage type. This does not refer to the proliferate coconut palm which can withstand the strongest of storms. It refers, in the main, to the fact that many avenues and thoroughfares in Nassau are tree-lined, the use of the casaurina for decorative purposes being indicative of Nassau’s desire to be attractive to tourists and potential residents. Media reports of past hurricanes affecting Nassau indicate frequent blockage of roads by trees.

In the Family Islands trees as decorative floiage play a less important role and in many cases natural vegetation cover is sparse. Thus Family Island damage response placed less emphasis on fallen trees and road blockage than Nassau respondents. As may be expected, crop damage was of greater significance in the Family Islands than in more urban New Providence. Flooding was also a major damage type reported from both New Providence and the Family Islands.

The surprising factor in damage response was the lack of emphasis placed on damage to dwellings throughout the archipelago. Specifically, it emerged that few dwellings suffered from damage and dwellings in the Family Islands did not suffer greater damage than dwellings in Nassau which contained a higher proportion of buildings of concrete or other more durable material. The reasons for the lack of dwelling damage may be twofold – first, the strength of the storms expressed as experienced hurricanes may not have been of sufficient magnitude to cause substantial structural damage; and second, materials used in house-building and the ratio of wood to stone or concrete is *fairly* uniform throughout the Commonwealth although in the Family Islands dwellings lack the decorative ostentation observed in Nassau and remain simply functional.

Damage to personal dwellings during the last-experienced hurricane was non-existent for sixty-five percent of all respondents, a figure which again challenges the ferocity and

intensity of experienced hurricanes in the Bahamas particularly as the negative responses included both wood and stone or concrete dwellings. Respondents whose dwellings did suffer damage expressed indirect causes rather than causes due to structure, this being particularly true of Nassau. Here tree damage figured prominently as did water penetration; In the Family Islands tree damage was absent but a sizeable minority of respondents reported direct damage. This group was the only expressed indication of the possible greater structural vulnerability of Family Island dwellings to hurricane damage. However, no firm conclusions can be drawn from the data.

#### Activities

Disseminated warning information before and during the threat phase before a potential hurricane strike stresses the need to remain inside the dwelling during the storm. The majority of respondents reporting hurricane experience took heed of this information seemingly as a matter of course. Conditioned attitudes and responses of this kind are prevalent in the Bahamas, indicating the importance not only of official and institutionalised information dissemination, but also of non-institutionalised family or kin based information sources where the experience of the 1929 hurricane by older family members plays a large part.

Nevertheless, despite this apparently conditioned element in response, many Family Island inhabitants reported that they sought shelter rather than remain in their own dwellings. Yet even this may be a conditioned response based upon legend and circumstantially derived information on the suitability of personal dwellings to withstand hurricanes. Certainly the apparent lack of confidence in personal dwellings casts doubt upon their perceived structural suitability. Moreover, though no respondent reported seeking shelter

in Nassau, a small number did remain in a designated place of collective safety such as a school or a church. No Family Island respondent reported staying in a designated place of collective safety implying either a lack of suitable buildings or a lack of information on the part of respondents.

Activities immediately after the departure of the hurricane were related either to repairs and the returning to normality or to activities primarily enacted to ease stiff and tired limbs gained through long periods spent inside the dwelling, or to satisfy curiosity. Chief among these activities was the surveying of damage to the immediate locality, a probable response to the claustrophobic hours spent in a battered and shuttered dwelling. For the children, post-hurricane activity is directed towards the gathering of fallen fruit.

Activities directed at a return to normality consisted primarily of sweeping up, repairing dwellings or opening them up, with sweeping up of particular importance and probably occurring simultaneously with a survey of damage. Those respondents in designated places of collective safety returned home while others checked the safety of friends and relatives, buried their dead (a rarity in the Bahamas because few lives have been lost in hurricanes especially during recent years), or simply thanked God.

There is no doubt that the occurrence of a hurricane is, for many Bahamians, a time of high excitement tinged with awe and foreboding. Moreover, it is a time of social cohesion. The following is a childhood recollection of the 1929 hurricane as it affected the island of Andros.

“...most families resorted to an old habit: they deserted their houses if they feared they might fall....and piled into the homes that appeared to be most stable....

....The common-sense policy of women....who believed in buying their needs and keeping a little for emergencies, was the working force in these situations. Coal and wood, flour and sugar, cocoa and milk, stored for the next week’s

subsistence were cheerfully hauled out of their storage tins and put at the disposal of all...  
 .... We sang and prayed and tumbled from side to side as the house rocked on its shaky wooden groundings... if one went to sleep he missed the old stories that were going the rounds among the adults. A terrifying but happy experience. When the hurricane abated the adults gave loud praise to God, the children rushed to the outside to gather and plunder... In our childish simplicity, we actually looked forward to the next hurricane when the battering and hammering could be heard for miles around, and excitement mounted at an equal rate to the wind's increase" (Ford, 1971).

### Hurricane Recurrence

The sparse and spasmodic hurricane history of the Bahamas influenced respondents concerning the recurrence of hurricanes similar to those experienced. While few negative responses were given, positive responses were overshadowed by the non-committal category. More surprising, on islands with some hurricane history, this response type nevertheless expresses the nature of hurricane occurrence in the Bahamas.

### PERCEPTION OF A FUTURE HURRICANE THREAT

Experienced hurricanes, to a great extent, were expressed in terms of implied variations in magnitude. Assessment of responses from respondents stating hurricane experience indicates a strong degree of uncertainty. Several factors emerge which are relevant to a discussion of the perception of future risk.

First, the factual hurricane history of the Bahamas reveals little activity of a magnitude severe enough to cause substantial damage.

Second, awareness of the hurricane threat among the majority of the population appeared as a mixture of legend from older family and kin and personal experience of *all* strong storm activity. The result produced a certain amount of confusion.

Third, given the sparse hurricane history of the Bahamas and the concomitant relative

uniqueness of each full hurricane strike to individuals, it is surprising that of those stating previous hurricane experience, the majority could not recall the vivid detail that might be expected from participation in a relatively unique event. The exception to this was the clarity of recollections from older inhabitants who had experienced the 1929 hurricane. Of these inhabitants, almost all recalled the 1929 hurricane in considerable detail but made little or no reference to more recent storm activity. Younger inhabitants, conversely, expressed recent storm activity as hurricane activity whether or not this was factually substantiated. Often descriptions of experienced hurricane damage and activity were coloured by information culled from other events of lesser significance or were legend-derived, principally, it is suggested, from the 1929 hurricane. Older inhabitants pointed out that it was to be hoped that a hurricane similar in magnitude to that of 1929 would not occur again. They were anxious to curb the wishes of younger family members to experience a full hurricane.

These factors considerably influenced respondents' perceptions of the hurricane risk *whether they expressed previous hurricane experience or not*. It is clear that most younger respondents believed that whatever experience they considered themselves to have undergone, they had yet to experience hurricane activity of great magnitude.

Asked to assess the likely degree of damage to their personal dwelling during a future hurricane, nearly half of the respondents from New Providence considered that damage would be substantial. A great number of these respondents had professed previous hurricane experience and had stated that, according to this experience, damage to personal dwellings was slight or non-existent. Awareness, thus, was adjusted when respondents were asked to assess *potential* risk. All risks were perceived as hurricane risks but hurricanes as a perceived

concept included a greater range of magnitudes and frequencies than hurricanes as officially defined. The significance of this is discussed elsewhere; often official hazard definitions do not coincide with community or individual hazard definitions leading, thus, to a dichotomy between action taken and action demanded [3].

Almost one-third of respondents from Nassau and New Providence also offered responses in the “unknown” category. Many could not perceive likely damage to their dwelling, a legitimate and comprehensible response among those with no previous hurricane experience but an unlikely one among those with stated experience. This again reflects the syndrome so typical of the Bahamas experience: full-force hurricanes are infrequent but publicly warned against, individuals are asked to prepare for a possible strike which does not occur – only the peripheral effects are felt. Therefore, hurricanes *occur* in that awareness upholds their proximity with a prompt from the media and family legend, but hurricanes *do not occur* in that perception of the effects of a full-force hurricane is keen. Responses from Nassau indicate a lack of consensus concerning potential damage to a personal dwelling. The hurricane is to be feared as an unknown quantity. Such a consensus was found to be further lacking in the Family Islands. The most sensible and carefully judged responses perceived potential hurricane damage as a function of the intensity of the storm. The majority of respondents, however, could make little detailed assessment of likely damage.

#### **Post-Damage Activities and Aid**

Further responses concerning where respondents would go if personal dwellings were badly damaged in a hurricane indicated a similar but not unexpected lack of consensus. Difficulties in the assessment of hurricane

magnitude plus difficulties in the assessment of potential damage led to a lack of perception of action likely to be taken in the event of substantial damage to personal dwellings. Responses tended to reflect the different normality emphases of individuals – financial loss, safe home environment, desire for government involvement, etc. Government facilities, the homes of relatives or friends, insurance companies, banks, and the Red Cross are given as places of possible refuge (if not physically then financially in the case of banks and insurance companies). A significant feature of these responses was the different emphasis placed on the value of government facilities or potential help in the Family Islands when compared with Nassau. Under twenty percent of respondents in the Nassau group indicated that they would attempt to locate a government designated safe place whereas nearly forty percent of Family Island respondents would rely on government sources of protection by removing themselves to a designated safe place, by seeking out their Representative or a government member, or by reporting to the local government Commissioner for their island. This may seem paradoxical because of the obvious proximity of Nassau respondents to government and the concomitant remoteness of Family Island inhabitants. Yet urban environments, by their very nature, lead to a remoteness and suspicion of the activities of the national executive and physical proximity to government also implies proximity to the machinery of bureaucracy which is frequently defined, at grass root level, as cumbersome. In the Family Islands, alternatively, Commissioners are appointed by the government to run the affairs of the islands on a local basis. Each Commissioner deals with a comparatively small population and a society devoid of the tensions of urban life. Consequently, the Commissioner is an integral part of a relatively stable social environment and tangible proof

that the government cares; so remoteness is, in most cases, not felt by Family Island inhabitants. Family Islanders, thus, have no hesitation in placing their trust and confidence in government sources for assistance.

The factor of government and the dichotomy between Nassau and the Family Islands is reinforced by perceptions of potential aid following a hurricane. Respondents from Nassau gave the cynical majority verdict of no expected aid at all from any source, a response indicative of apathy and a lack of faith in the people in control or in a position to offer aid. In the Family Islands the single biggest response pointed to government sources of aid and yet the majority of these responses indicated remoter political figures, such as a member of the executive, rather than the Commissioner who is accessible. It can be assumed that the Islanders, in close contact with their Commissioners on a day-to-day basis, would know of his limitations in situations of community stress demanding corporate action.

Over fifty percent of all respondents, however, had no knowledge of anyone who had received help after a hurricane, this despite the large majority claiming previous hurricane experience. Yet implied attitudes differed between Nassau and the Family Islands. In the latter, for example, responses expressed a contented reliance on the fact that aid, particularly from government sources, would be forthcoming if the situation arose whereas impressions gained from Nassau were of a cynical fatalism.

### **Damage Reduction**

A majority of respondents throughout the archipelago had knowledge of some methods of damage reduction. A substantial minority did not know how to reduce damage even on a simple level but this cannot necessarily be attributed to ignorance but rather to a lack of

interest in the question. Positive damage reduction types can be summarised as follows for New Providence.

1. General activities associated with battering up. Battering up is the most consistently undertaken of all protective acts being positively associated with the physical protection of the home. Most homes in the Bahamas carry shutters for covering windows and battering up activities (which include any action promoting the physical security of the dwelling) are subconsciously and regimentally carried out in response to hurricane threat situations as prompted by environment or media derived warnings.

2. Cutting down trees was an activity relevant to Nassau in particular in the light of earlier discussions concerning witnessed hurricane damage. Many Nassau residents considered tree damage, either from actual experience or from media-derived information, as the single most probable cause of damage from an indirect source.

3. Securing or neutralising other factors likely to cause damage indirectly such as television aerials, loose objects around the house — for example, oil drums or trash cans — and the shutting down of electric power.

In the Family Islands responses concentrated almost solely on battering up activities with smaller supplementary and elaborative items showing a similarity with responses from Nassau — the cutting down of trees, the removal or securing of dangerous objects, and the cutting off of electricity. Other supplementary responses were legend-derived — for example, keeping the part of the house directly facing the hurricane empty or leaving one door open while the storm is in progress. These responses indicate the educational role of past hazard perception as expressed through family and kin information sources. Further responses looked to the long-term — the reduction of damage by building in stone, building on higher land or constructing shelters.



### Warning Sources and Information

The Commonwealth of the Bahamas is well served by media through which hurricane warning information can be disseminated. Radio Bahamas, providing an inter-island community service operating from Nassau, was established in 1936 principally to disseminate hurricane warning information. This may have been in direct response to significant hurricane or near-hurricane activity during the years from 1926 through 1929 (Lewis, J., 1975). The reliance of the Bahamas' population on information via the radio is heavy, ninety-five percent of all families in the archipelago owning a radio with many owning two or more. Television is unimportant outside of Nassau and, therefore, of little use as a medium for hurricane warnings. Radio reinforcement from mainland radio stations in Florida is profuse, these stations being easily obtainable on radios throughout the Bahamas. The situation of the Commonwealth adjacent to the Miami National Hurricane Center aids the speedy diffusion of up-to-date information and plotting. Given these facts, perceptions of the principal sources for hurricane warnings were predictable and as follows:

1. Great emphasis was placed upon the reception of hurricane warnings from radio sources in both New Providence and the Family Islands.

2. Televisions were only given as sources of warning information in Nassau, this reflecting the lack of television sets in the Family Islands.

3. Among minor responses, some took warning information back to its original source stating that hurricane warnings are available from the United States or the meteorological office.

4. Other minor responses from the Family Islands referred to the Commissioner or the local hurricane committee as sources of warning information. These were obviously insignificant compared with radio warnings

and had little relevance to overall warning psychology. The hurricane committees do produce and display warning information but it must be remembered that committee members would obtain their information from the same radio source as the rest of the community.

Respondents expressed the kind of information they would like to receive during a hurricane watch-and-warning in terms of their own practical experience of previous warning situations. The information respondents wished to receive was also expressed, in many cases, as information *actually* received in the past. Two categories emerged – warning information including specific instructions concerning personal and community precautions and preparedness, and information concerning the physical properties, magnitude, intensity and locational status of the actual storm.

By far the greatest number of respondents required to know when to take precautions, either expressed in direct terms or through statements indicating imminent and genuine danger.

Descriptive information concerning the actual storm was demanded by one-quarter of all respondents although the detail of the information required depended upon individual priorities and circumstances. Thus, a range of responses emerged as follows:

- a. The direction in which the hurricane is travelling.
- b. The location of the hurricane vis-à-vis a respondent's personal location.
- c. The wind velocity of the hurricane.
- d. The distance of the hurricane from a respondent's location and its estimated time of arrival at that location.
- e. The strength of the hurricane – that is, the likely destructive capacity.
- f. The likely size of the waves accompanying the hurricane.

It can be assumed that the optimum degree of warning information for inhabitants of the Bahamas should contain mention of both

storm status and necessary precautions and preparedness. Most respondents do not require to know what specific precautionary action to take but rather *when* to take precautions or the degree of likely danger. Most respondents appeared to be satisfied that if they were told to take precautions, they could undertake the necessary action without further prompting.

This is reinforced by the number of respondents who considered themselves to be reasonably well prepared for the next hurricane. Questions concerning the perception by an individual of his state of preparedness asked respondents to place their perceived state into one of five categories – very well prepared, well prepared, adequately prepared, poorly prepared and very poorly prepared. A large majority of all respondents gave one of the middle three categories, although the biggest single response in Nassau expressed ‘poor’ compared with ‘adequate’ in the Family Islands. Thus, most respondents did not overstate their preparedness preferring, as with the perception of future hurricane activity, to remain cautious and guarded.

#### **Folk-Based Perception of Hurricane Properties and Signs**

Individual assessment of the hurricane hazard in the Commonwealth of the Bahamas is derived from legend and media information reinforced by actual experience of a wide range of storm activity. Legend-derived information comprises compacted and embellished factual material from past hurricane activity directed through family and kin education functions plus traditional folk-myth themes concerning hurricane properties and warning signs. These folk-myth elements constitute more primitive but astute attempts to comprehend and measure the hurricane hazard outside of official and formal institutionalised information sources.

The first category of folk-myth responses

concerned the methods utilised by respondents in the recognition of the approach of an imminent hurricane other than by formal warnings via the media. A wide range of responses was collected, often lengthy and colourful in character and based upon personal perceptions of the natural environment. In summary, the majority of responses from New Providence expressed the approach of a hurricane in terms of perceived weather changes in general or specific weather changes such as changes in the wind. One-quarter of respondents from New Providence expressed no way of recognising the approach of a hurricane other than via official warning media. Two reasons were primarily responsible for the existence of this response category:

1. A lack of personal hurricane information either legend-derived or experience-derived. Many older inhabitants would not have experienced the 1929 hurricane (because it did not affect all locations) while younger inhabitants may have avoided recent hurricane or near-hurricane activity. The combination of these factors, especially among respondents born after 1925 (that is, too young to have vivid personal memories of the 1929 hurricane, if experienced), produced limited perceptual capabilities and a strong reliance on official information.

2. The prominence of attitudes reflecting the relative velocity of hurricanes, a velocity perceived by some respondents as great and, in the absence of official warnings, too great to judge or estimate the storm’s arrival in time to prepare for a strike. Such responses were fatalistic in tone and revealed a respondent’s preference for official warning information – some respondents did not care to trust their own perceptual capabilities.

Smaller response categories expressed the behaviour of domestic animals and birds as a method of assessing the imminent approach of a hurricane, neighbours telling each other (although it is not clear how the information

would begin to circulate), the stillness of the trees, by telephoning the meteorological office (although the time to do this was not stated), and the build-up of the sea.

The following are examples of actual responses given in Nassau and New Providence:

“The wind blowing from the north-east to the north-west is a sure warning.”

“You pick it up from the uneasiness in the air.”

“A yellow sky.”

“Watch the animals – the birds come on land.”

“Listen to the wind.”

“Look at the skies – look for the cloud build-up.”

“Only by telephoning the meteorological office.”

“Clouds flying along the sky.”

The situation in the Family Islands was similar to Nassau in summary – the major response categories referred to weather changes while changes in the wind were again specifically mentioned. A greater number of respondents expressed no way of recognising the approach of a hurricane other than through official warning media, a slightly surprising figure (almost forty percent) given the relative lack of proximity in the Family Islands to more sophisticated technological and other information stimuli compared with Nassau residents. However, the explanation may be sought in the comfort felt by many Family Island residents in the participatory relationship many of them have acquired with local Commissioners and government representatives. Mention of the sea and its alteration prior to a hurricane strike constitutes a larger response category in the Family Islands as might be expected with so many low-lying, coastal settlements, some with fishing as the predominant economic activity. Other responses referred to the use of “The Almanack”, an old book which lists past storms and their locations. This response was given principally by older residents who con-

sidered that referral to the “Almanack” would aid in predicting whether an imminent hurricane would strike their community or not. Religious fatalism was also expressed – “It depends on the Lord” – while use of the barometer was surprisingly mentioned in the Family Islands while being absent from Nassau responses.

The following actual responses from the Family Islands are indicative of significant folk-myth elements in hurricane perception:

“Watch the clouds and the design of the sky, changes in the sky. There’s a red glow in the sky if a hurricane is coming.”

“You look for a branch in the east and a branch in the west with a rainbow in between to the north of the sun and that’s a hurricane travelling.”

“No, if you don’t get a warning, you don’t know.”

“The whole place goes dry and then the sea comes back.”

“The hurricane birds come before it.”

“The barometer is dropping and you get the feel in the air.”

“There’s no wind and it’s very hot.”

Hurricane formation and its processes and locations are complex climatological issues. Not unexpectedly, the majority of respondents understood little of these processes. Nevertheless, any assessment of responses to questions concerning where hurricanes come from must be viewed in the light of information available to individuals in the form of hurricane tracking maps issued by the printed media, by commercial companies and by local hurricane committees. Such tracking maps, allowing people to follow the progress of imminent hurricanes, might contain information about hurricane formation similar to the following:

“A West Indian hurricane is by definition an intense tropical storm with roaring winds rotating around its center, or ‘eye’, at 74 miles per hour or stronger.... At birth it begins to form when moist air, heated by the sun, rises from the surface of a warm tropical sea. It

funnels up in a natural updraft much as hot air in a house is drawn up a fireplace flue. The moist air rises, cools and condenses into rain. In this condensation process, huge amounts of heat are fed back into the air to add to the force of the storm's updraft and thus provide a main source of the hurricane's power. As the air goes spiralling upward, more hot, moist air rushes inward from all sides to replace it and keep the updraft moving. The motion of the earth's rotation eastward deflects these inpouring currents to one side and, north of the equator, starts a counterclockwise movement. Then the winds whirl faster until they reach 74 miles per hour when the storm officially becomes a hurricane" (Esso Standard Oil S.A. Ltd., 1964).

Such descriptions of hurricane formation, though considerably simplified, still require a knowledge of climatological processes and concepts such as condensation or the Coriolis Force for adequate comprehension. This detailed knowledge is likely to be absent in most people and the Bahamians are no exception. Thus, from an analysis of responses as to where hurricanes come from, the following points emerge:

1. Responses were expressed in terms of the location of the primary area of hurricane-generation serving the Bahamas, or in terms of an estimation of the processes involved in hurricane formation.

2. The range of response categories indicate no real knowledge of hurricane formation among respondents. Responses tended to be vague and contained limited knowledge.

In Nassau many responses included elements of hurricane formation even though actual processes were not understood. Thus, expressions such as 'air pressure' or 'hot air' were frequently given while others associated hurricanes with depressions, the sea (and more specifically, the bottom of the sea), or hot and cold air. All these responses contained an element of truth in that they referred to parts or elements connected with hurricane formation as given in the simplified example above. Other 'process' responses, however, contained myth-derived concepts and notions – for example, the association of hurricanes with mountains (an allusion to the proximity of the Bahamas

to mountainous Eastern Cuba across which hurricanes are known to have travelled on their journey northward), and the more extreme 'earth eruptions'.

Locational responses referred to hurricanes emanating from 'the south' in general terms, or 'the Gulf' or the Caribbean in more specific terms. Other responses dismissed the question with a flippant 'they just build up'. Examples of actual responses from Nassau and New Providence reveal the infiltration of folk-legend and religious factors:

"From the bottom of the sea or behind mountains – heat trying to get out."

"Only God can answer that."

"Hot and cold air fusing together."

"From heat, but wind develops with squalls, etc."

"The sea has something to do with it."

"Earth eruption."

"They form in the Gulf but the Lord knows where it comes from. A hurricane is just like the devil."

In the Family Islands the sea again played a major role in response patterns. The largest single response category referred to the manifestation of hurricanes from the sea or the bottom of the sea. Further responses referring to processes of hurricane formation expressed air pressures, hot air, depressions or hot and cold air as primary forces along with vaguer expressions alluding to changes in the weather or atmospheric disturbances. Other 'process' responses retained folk-myth qualities and included mountains, tornadoes (an astute analogy to the circular wind pattern associated with hurricanes), combustion, and a 'hot planet' (although the actual planet was not specified). Locational responses included 'the Gulf' or the Caribbean and 'the east and west'.

Specific responses from the Family Islands reveal further reliance on folk-myth or religious themes in the assessment of hurricane processes and locations, to a greater degree

than responses from Nassau:

“From the bottom of the sea and it whirls round like a whirlwind.”

“Tornado developing and growing into hurricanes.”

“Sometimes from the east, sometimes the west.”

“Basically from Miami depressions.”

“Combustion, some kind of churning up, a certain gas.”

“From the valley of a mountainous place, from heat.”

“I’m sure it ain’t God’s work.”

“Flat area between mountainous land.”

“The ocean, but God stirs it.”

“By pressures of wind, low and high, cold and hot meeting and this causes a circular movement and motion.”

“From the Bible. Made by God to destroy wicked men in wicked cities – the disobedience of man.”

In the Caribbean there exists a folk rhyme which succinctly summarises the official hurricane season. It is sometimes quoted in the Bahamas and runs as follows:

“June too soon  
July stand by  
August it must  
September remember  
October all over.” (Edwards, 1961)

Thus, the official hurricane season, publicised by government and the media, occurs between the months of June and October – it is the period of most intense hurricane activity. Of course, hurricanes do not always conveniently occur between these months – rogue hurricanes have been known to occur in the Bahamas well outside the official season but these are a rarity.

Nevertheless, and even allowing for certain fluctuations from the officially designated season, inhabitants of the Bahamas are not clear when to expect hurricanes. Twenty-five permutations were given, some including the

months of the official season but many including only part of the season. Some, indeed, fell right outside the official season. For example, of the response categories from Nassau and New Providence, only four included the months from June to October while ten included part of this period. In the Family Islands only three responses included all the months from June to October while twelve categories included part of this period. Four categories from the Family Islands fell right outside the officially designated season.

The reason for this extraordinary range of responses is unclear but certainly it can be assumed that responses are based on legend and personal experience rather than official information sources. An earlier discussion has revealed the large part played by storms of below hurricane strength in the personal assessment of hurricane experience and with many of these storms occurring outside of the official hurricane season it is clear that this kind of personal experience may have influenced the stated period for hurricane occurrence.

## SUMMARY AND CONCLUSIONS

Hurricane occurrence in the Commonwealth of the Bahamas is infrequent and spasmodic. The archipelago, historically, has only been visited by full-force hurricanes on a few occasions. Hurricanes frequently pass adjacent to the Bahamas so that only peripheral effects are felt. However, numerous tropical storms of below hurricane strength do occur and these play a considerable part in *hurricane* response and perception by inhabitants of the Bahamas because of the proliferation of low-lying coastal settlements lacking shelter from substantial vegetation cover which are vulnerable to damage from low-intensity climatic events. The high-intensity hurricane of 1929 affected substantial numbers of the population of the archipelago and was vividly recalled by many older respondents. Post-1929 hurricane

activity has been documented, including hurricane "Donna" in 1960 and hurricane "Betsy" in 1965, but although these caused considerable damage to some islands, the magnitude of the storms appears to be somewhat lower than that of 1929 and to have affected a smaller population. Attitudes to past hurricane activity are, therefore, attitudes to perceived damage-causing storms of varying intensities coloured with legend-derived information from predominantly family and kin sources, generated particularly from the experiences of older residents who recalled the 1929 hurricane. Perception of future hurricane activity is a function of past experience and legend-derived information adjusted, in most cases, to take account of the fact that most residents believed future hurricane activity *might* be substantially more severe than that already experienced.

Respondents who professed experience of previous hurricane occurrence placed greater emphasis on damage done to the area within which their home was located than on damage done to their personal dwelling. Two conclusions can be drawn from this: first, that dwellings, generally, were adequately constructed; and second, that the particular hurricane experience alluded to was not of sufficient intensity to effect much damage upon dwellings.

The majority of respondents reported remaining inside their dwelling during the last experienced hurricane which they are advised to do by hurricane safety information disseminated before and during the warning and threat phases prior to a strike. Those respondents in the Family Islands who did not trust the safety of their own dwellings often stated that they were uncertain where to seek shelter. In Nassau, respondents leaving their homes sought shelter in government designated places of collective safety such as schools or churches. Family Island residents did not appear to have the same information concerning safe places as Nassau residents.

The majority of respondents considered the possibility of another hurricane, similar to that experienced in the past, to be likely. However, there was no consensus on the question of where people should go if their house was substantially damaged in a hurricane. This again suggests a lack of adequate information on the provision of safe places.

Indeed, one significant feature of future hurricane perception was the dichotomy between respondents from Nassau and those from the Family Islands on the matter of reliance on government sources of aid after a hurricane. While considerable aversion to reliance on government sources of aid following a hurricane was expressed in Nassau, in the Family Islands this reliance was an important factor, expressing the close relationship between Family Island residents and government-appointed local Commissioners. After a severe hurricane in Nassau the government would undoubtedly be required to provide aid and, in order to instigate a change in attitude on the part of Nassau residents, it would need to be *seen* to provide aid.

Generally, respondents were satisfied that the currently operating warning service, particularly via the radio, worked satisfactorily. Respondents required warning information first, on when to take precautions, and second, on the imminent hurricane's physical properties and progress. This reflects individual and community priorities.

Respondents considered themselves to be adequately well or adequately poorly prepared for the next hurricane. In general there existed a lack of specific concern which reflected a feeling among inhabitants of the Bahamas that they could cope with most hurricane situations adequately. This may be considered a false complacency if judgement was based on previous experience with storms of below hurricane intensity.

Folk-myth methods of observing the approach of an impending hurricane (other than via the

official warning system) were varied and colourful and provided reinforcement to warnings from official channels. Similarly, while little knowledge of hurricane formation and the location of the areas of hurricane-generation was expressed, many respondents utilised folk-myth or religious interpretations of these climatic processes which, in many cases, partly coincided with climatic fact. It would not be necessary for residents to know in detail the facts concerning hurricane-generation as this would do little to aid an individual's perception of hurricane occurrence nor his interpretation of warning signs. However, interpretation of the hurricane season produced a wide range of responses, many falling outside of the officially-defined season of June through October when the most intense hurricane activity can be expected. Obviously, and with the considerable lack of actual previous hurricane experience evident among inhabitants of the Bahamas, official stressing of the months of greatest vulnerability (with adequate warning of the *possibility* of hurricanes occurring outside of the stated period) would aid overall preparedness.

## NOTES

- 1 This paper describes the results of a questionnaire survey which attempted to suggest the extent of attitudes to and perception of the hurricane threat in residents of the Commonwealth of the Bahamas, as part of a mission to review and make recommendations on the state of predisaster planning in that country, undertaken, during November 1974, by the Disaster Research Unit, University of Bradford, England, on behalf of the League of Red Cross Societies. The author wishes to extend his thanks to the League of Red Cross Societies for their kind permission to reproduce this material.
- 2 The full questionnaire survey form utilised during the survey is reproduced in Lewis, J. (1975), Appendix 8, pp. 71–72.
- 3 Differences in hazard perception between resource users and planners are explained in Burton and Kates (1964).

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