

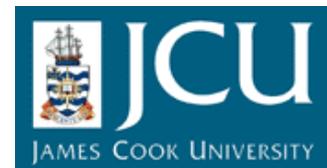


# Local stakeholder's perceptions and integrated water management of World Heritage Areas in northern Queensland

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# Natural Resource Management Regional Boundaries in the Great Barrier Reef Catchments



Location of the GBR region with regional NRM bodies (red boundary lines and text) and catchments (blue areas)



Source: Haynes et al., 2005



## Reef Water Quality Protection Plan (2003):

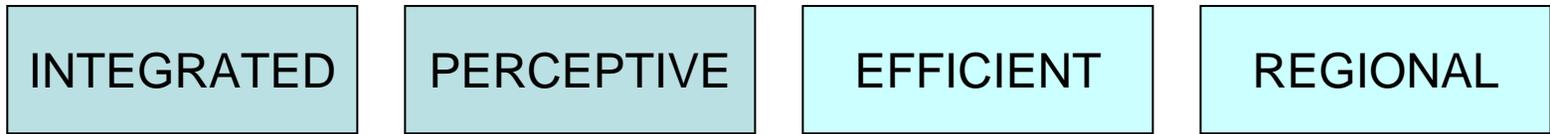
Improvement in land use practices resulting in sustainable use of natural resources

Need for a “translation” of sustainability concept to issues relevant to individuals



Need for communication of individual concerns to policy-making level

# Concept and methodology



INDIVIDUAL WELLBEING FUNCTION (IWF):

$$f [(n_{1w}, \dots, n_{xw} \text{ ecosystem}), (n_{1w}, \dots, n_{xw} \text{ economic}), (n_{1w}, \dots, n_{xw} \text{ social})]$$

Allowing for quantification of the factors

# Individual Wellbeing Function IWF



$$IWF = EC, EL, S$$

$$EC = \sum_{i=1}^n F_i * W_i$$

$$EL = \sum_{j=1}^m F_j * W_j$$

$$S = \sum_{k=1}^p F_k * W_k$$

Where:

IWF = Individual Wellbeing Function;

EC = economic;

EL = ecological;

S = social;

F, i, j, k = factors of human wellbeing;

n, m and p = number of factors;

W = weights

# Factors of wellbeing



## **Society – Family and community**

Family relations  
Community relations  
Personal/family safety  
Cultural identity  
Personal/family health  
Civil and political rights  
  
Personal/family education levels  
Council relations  
  
Sports, travel, entertainment  
  
Other, to specify

## **Ecology – Natural environment**

Air quality  
Water quality  
Soil quality  
Access to the natural areas  
Biodiversity  
Swimming, bushwalking and other activities in the nature  
Fishing, hunting, collecting produce  
Beauty of the landscape/  
beaches  
Condition of the landscape/  
beaches  
Other, to specify

## **Economy and services**

Work  
Income  
Housing  
Health services  
Recreational facilities  
Condition of the roads  
  
Public infrastructure and transport  
Training and education services  
Support services  
  
Other, to specify

# Land use in GBR catchments



Land use area (%)	Overall GBR %
Nature conservation	9.12
Other protected and indigenous uses	3.62
Production forestry	8.14
Plantation forestry	0.00
Grazing natural vegetation	55.78
Grazing modified pastures	3.28
Dryland cropping	3.66
Dryland horticulture	0.02
Irrigated pastures and cropping	1.38
Irrigated horticulture	0.04
Urban intensive uses	0.12
Unclassified	0.80
Minimal use	10.10
Water	2.40

# Results of the change



## Estimated change in pollutant inputs to the Great Barrier Reef

	Pre-1850s annual pollutant flux estimate	Current annual pollutant flux estimate
<b>Sediment</b>	1-5 Million tonnes per year	14 million tonnes per year
<b>Phosphorus</b>	2 400 tonnes per year	7 000 tonnes per year
<b>Nitrogen</b>	23 000 tonnes per year	43 000 tonnes per year

# Economic value of GBR catchments



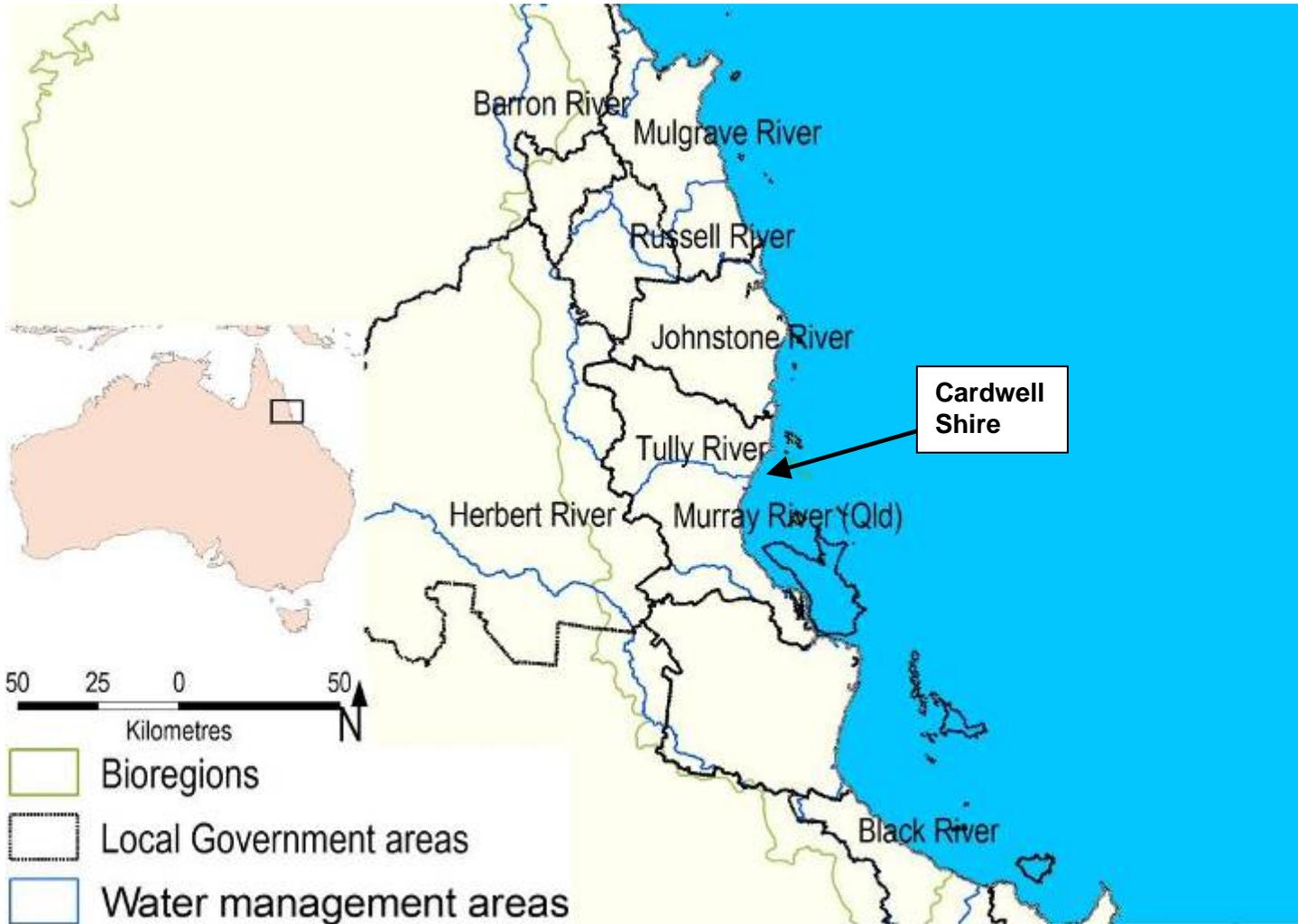
Industry	Gross Value (\$m)	No. of people employed
Mining	7,052	10,380
Tourism	4,269	47,660
Mineral processing	1,392	3,918
Beef	1,017	8,728
Sugar cane	803	8,736
Horticulture	708	9,006
Recreational fishing	240	NA
Commercial fishing	119	641
Aquaculture	38	378
<b>Total</b>	<b>15,638</b>	<b>90,000 +</b>

NATIONAL RESEARCH  
FLAGSHIPS

Source : Productivity Commission Report 2003



# Location of the case study



## Methods:

**2 case studies**

-Secondary data analysis

-Primary data collection

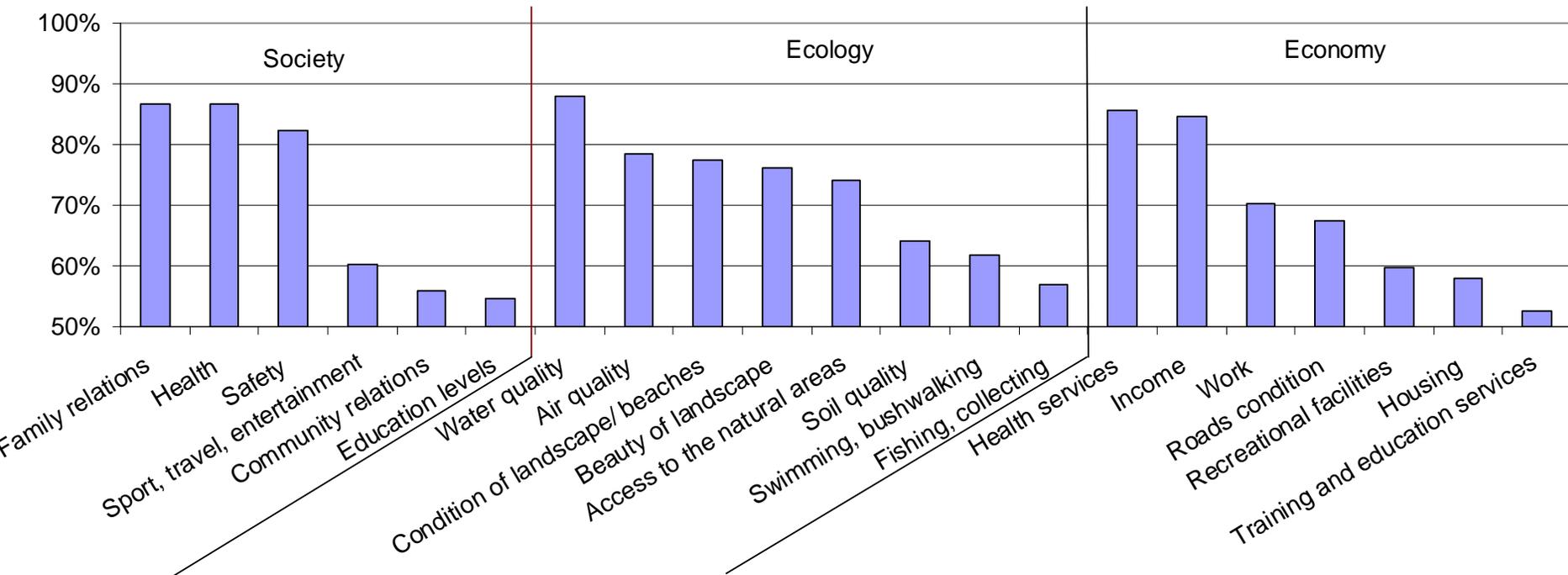
## Secondary data collection



Questionnaire containing socio-demographic questions; followed by wellbeing questions

- Pilot phase completed (27 interviews)
- Mail phase:
  - 409 questionnaires (15% HH) mailed out using Dillman's Total Survey Methods
  - Total 180 valid responses  
6.85 of total households;  
response rate of 43.9%

# Results



Factors selected as important by more than half of the respondents

(% of 180 respondents that selected the factor)

# Results



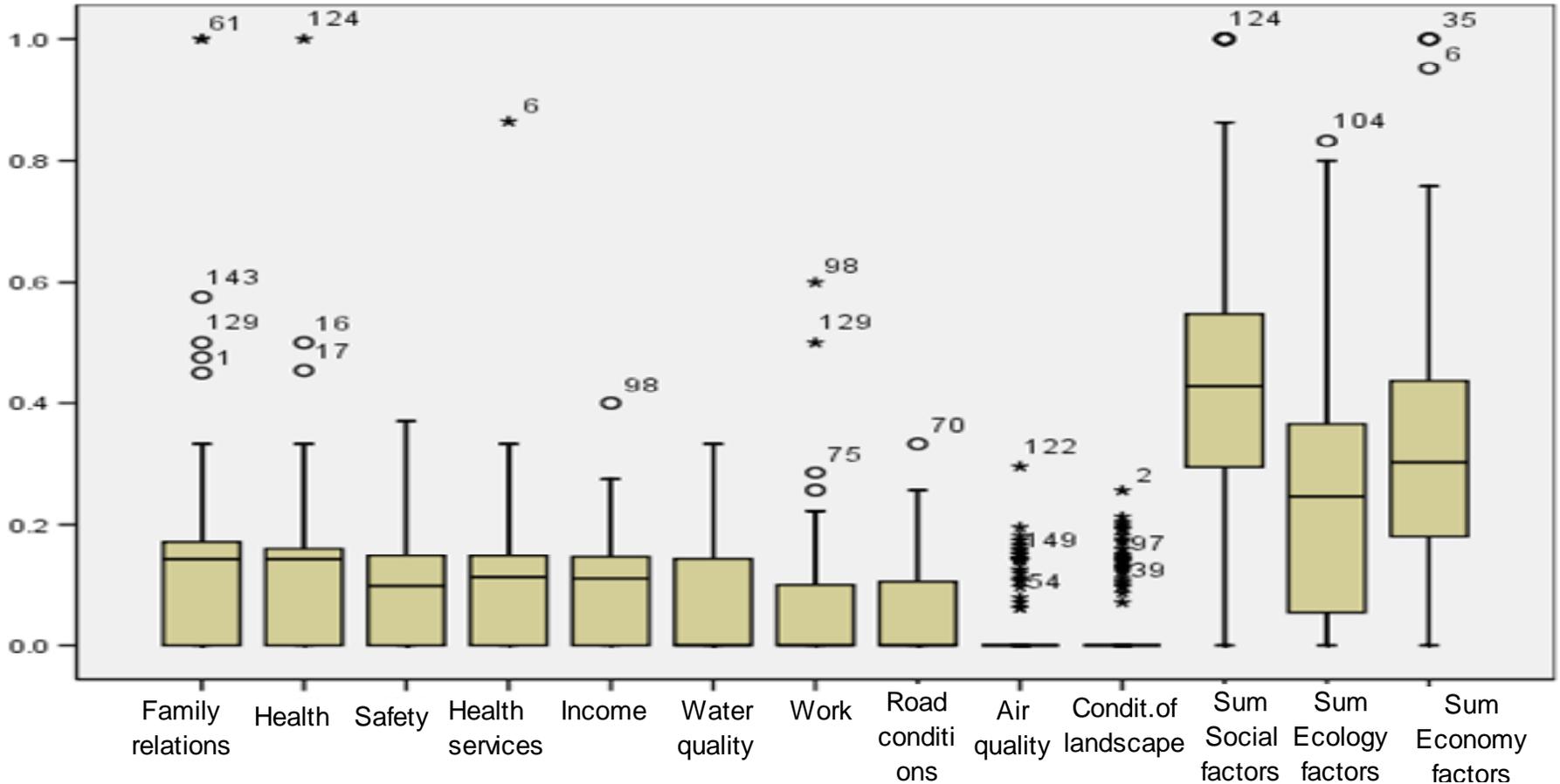
Demographics and socio-economics influence IWF?

IWF of a single male in his 20s, Australian-born and tertiary educated, employed in a private services sector, with an annual household income of 100-150,000A\$, and living in the shire for more than 15 years.

$IWF1 = [EC \text{ (work 0.045)}] + [EL \text{ (fishing 0.230 + beauty of landscapes/beaches 0.140)}] + [S \text{ (family 0.450 + health 0.086 + sport/entertainment 0.045 + political and civil rights 0.009)}] =$

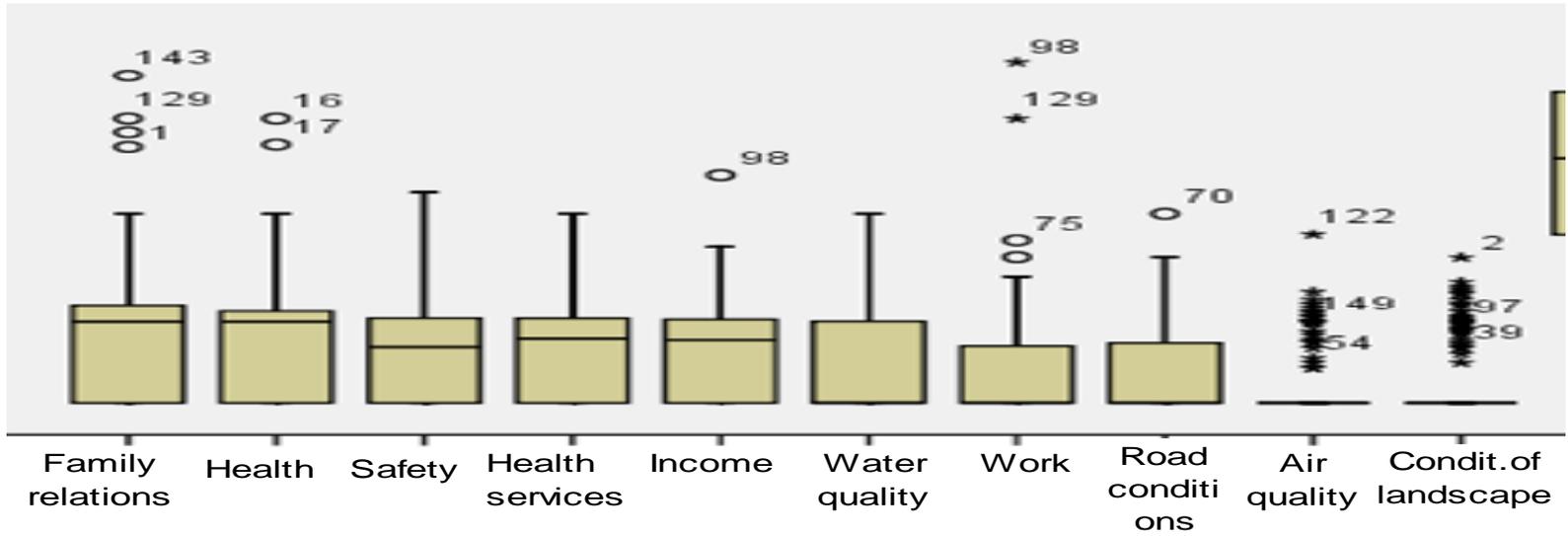
$$EC (0.045) + EL (0.365) + S (0.590) = 1$$

# Results



Ten wellbeing factors receiving the highest scores in the Individual Wellbeing Functions (IWF) and sum of scores for the three domains (n=167, mean with standard deviation)

# Policy implications



Average

satisfaction scores: 8.6    8.2    8.1    5.7    7.7    7.1    9.1    4.5    8.0    5.3

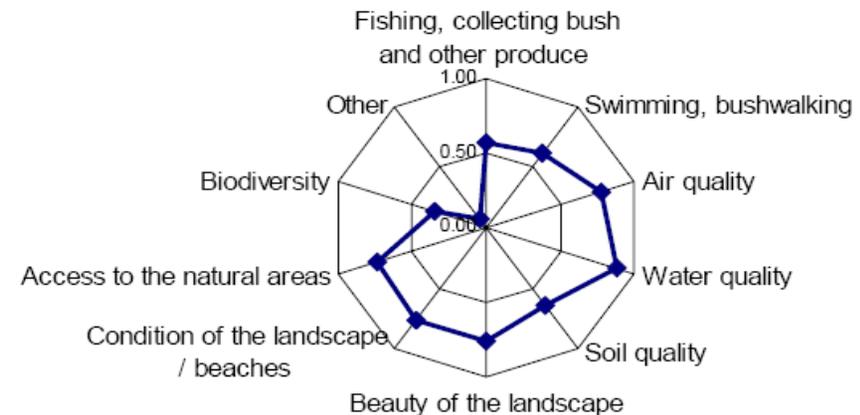
scores:

On the scale from 1 (least satisfied) to 10 (most satisfied) : 7.5 “homeostasis level”

# Water quality factor - Policy implications



- High awareness (89% selects as important; 42% as one of 5 most important factors of wellbeing)
- Reasonable satisfaction (7.1 out of 10)
- Satisfaction trajectory over time?    ↑    ↓
- Additive utility through fishing, swimming, health, condition of the beaches....potentially higher utility than the value of “water quality” factor alone.
- “Tipping potential” – due to high awareness can easily become “big issue”?



# Policy implications



## Reef Water Quality Protection Plan (2003):

“Deteriorating water quality is acknowledged as being chiefly a result of pollution from broad-scale agricultural land use activities”

But little has been done....

- Economic issue? Gross value of tourism 2x all agriculture
- Social issue? People are aware
- Political issue? The emphasis on concerns about the costs to agricultural incomes
- Communication issue? Participants’ concern about water quality, captured in this research, indicate that policy actions resulting in improved water quality may generate greater support from the community than is expected by policy makers.

## Policy implications



The improved understanding of factors of importance to catchment populations' wellbeing can support decision-makers in devising desirable and therefore acceptable options for integrated management at the catchment scale.

Such options or “trade-offs” would not only promote sustainable development, but would also appeal to local residents.

# Acknowledgments



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