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Facilitating adaptation to global climate change: perspectives from experts and decision makers serving the Florida Keys

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Abstract Slivers of land amidst the world's third largest barrier reef, the Florida Keys provide unique insights on the emerging challenges associated with adaptation to global climate change. While political will and public awareness are gradually shifting on the imposing risks, analysis of survey responses from experts and decision makers serving the Florida Keys (federal, state and local personnel) reveals insufficient resources, limited direction and leadership, and lack of institutional frameworks to facilitate the adaptation process. Against this backdrop, we investigate experts and decision makers' interest in an array of adaptation measures including their willingness to support a proposed 'Community Adaptation Fund' (CAF) to mobilize resources and lay the foundation for adaptation initiatives in the Florida Keys. We also explore potential funding sources for establishing the proposed CAF, and test the feasibility of a diverse set of financing mechanisms. We discuss implications of our findings in the context of enhancing adaptive capacity in the Florida Keys and beyond.

1 Introduction

Global climate change presents coastal communities with profound and multidimensional challenges and potentially severe ecological and socio-economic repercussions, which undermine traditional decision-making strategies and management regimes (Adger et al. 2009; NRC 2009; Williamson et al. 2010). Without updated institutional frameworks and clear rules of engagement, interagency coordination and resource allocation are scarce,

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adaptive capacity is low, and adaptation is highly limited and fragmented (Kriesel et al. 2005; Fabricius et al. 2007; Vogel et al. 2007; US GAO 2007a). In the face of rising vulnerability, novel and policy-relevant decision-making criteria, regulatory mechanisms and institutional structures are vital to enhance coastal resilience (Adger et al. 2005; Pielke 2007; Smith et al. 2009).

The Florida Keys represent a unique coastal socio-ecological system with considerable vulnerability to climate change. The Florida Keys contain 4 National Wildlife Refuges, 3 National Parks, a National Marine Sanctuary, 2 Ecological Reserves, 12 State Parks, Botanical Sites and Aquatic Preserves, and over 20 endangered species, including two species of coral (Elkhorn and Staghorn), the building blocks of reefs (US GAO 2007b; Donahue et al. 2008). A multibillion dollar, nature-based tourism economy, with average elevations less than 1.5 m above sea-level, the Florida Keys are on the frontline of the climate crisis. Highly porous limestone geology, frequent threats from tropical cyclones and relative isolation from the mainland add to a host of other factors that result in the region's near and long-term vulnerability to climate change (Shinn 2008; Ross et al. 2008; Zhang 2011).

Initial research revealed deep concern among federal, state and local experts and decision makers serving the Florida Keys about adverse climate change impacts (Mozumder et al. 2011). A large majority of respondents recognized the increasing likelihood of dynamic, potentially irreversible, impacts to natural systems and areas, resources, public health, infrastructure, water management, land use, social and economic sectors in the Florida Keys. However, very few experts and decision makers reported that their respective agencies had developed formal adaptation-actions plans. Respondents identified significant institutional and social barriers to adaptation. In short, a concrete information–action gap exists in the adaptation arena (Mozumder et al. 2011). In this context, the present study investigated experts and decision makers' interest in an array of adaptation measures to minimize the adverse effects of climate change, including their willingness to support a proposed 'Community Adaptation Fund' (CAF) to mobilize resources and lay the foundation for adaptation initiatives in the Florida Keys. In addition to mobilizing resources, a CAF might well provide the organizational vehicle to formally address climate change issues at the local and regional level (Klein et al. 2005; McGranahan et al. 2007; Pelling et al. 2008). We also explore potential sources for establishing the proposed CAF, and test the feasibility of a diverse set of financing mechanisms. We discuss implications of our findings in the context of enhancing adaptive capacity in the Florida Keys and beyond.

Under the United Nations Framework Convention on Climate Change (UNFCCC), the Parties to the Kyoto Protocol established an Adaptation Fund (AF) in 2001 to finance concrete adaptation projects and programs in developing countries, communities and sectors particularly vulnerable to the adverse effects of climate change. Officially launched in 2007, under the supervision and management of an Adaptation Fund Board with members of appropriate technical, adaptation, and policy expertise, the AF provides both a decision-making structure and coordinating mechanism heretofore absent in the adaptation arena (UNFCC 2010a). However, we are not familiar with any study focused on evaluating support for a 'Community Adaptation Fund' (CAF) to facilitate adaptation projects in developed nations.

2 Background

The Florida Keys are an archipelago of some 1700 islands, stretching 354 km. The islands consist of Pleistocene limestone, covering a land area of roughly 355 km^2 with an average

elevation of less than 1.5 m above sea level. The islands have a tropical climate with rainfall concentrated between May and October (Shinn 1988; Halley et al. 1997). The Florida Keys are located in Monroe County, the southernmost county in the continental U. S. There are 46 inhabited islands in the Florida Keys, connected by 42 bridges of the Overseas Highway. Approximately 80,000 residents (35,000 households) live in the Florida Keys, with one-third living on the island of Key West (Census 2000). The Florida Keys (a multibillion-dollar, tourism economy), host four million seasonal visitors and tourists annually (Donahue et al. 2008).

The Florida Keys are adjacent to the third largest barrier reef in the world, extending over 480 km. This complex ecosystem contains more marine species than any other region in the U.S., including approximately 100 species of coral and 400 species of fish.[1] The reef also buffers the shoreline as natural breakwaters. In 1990, the Florida Keys National Marine Sanctuary and Protection Act established a Sanctuary and Advisory Council to protect, manage and conserve 9,500 km^2 of coastal and ocean waters surrounding the Keys (Donahue et al. 2008; Gibson et al. 2008; Shinn 2008).

The Florida Keys are also home for globally imperiled Pine Rockland and tropical hardwood hammock (Ross et al. 2008). The islands provide nesting sites for five species of endangered sea turtles, and habitat for over 250 avian species. The National Key Deer Refugee provides critical habitat for 22 endangered and threatened species.[2] The Keys are also located in the prime Atlantic hurricane-forming region where tropical cyclone activity presents an annual threat to the ecology and economy alike (Harrington and Walton 2008; Titus et al. 2009).

Climate change will have profound impacts on the sustainability of the low-lying, island communities of the Florida Keys (Stanton and Ackerman 2007; Gibson et al. 2008). The combination of rising temperatures, changes in ocean chemistry, significant long-term increases in intense hurricanes, storm surge flooding, extreme precipitation events and accelerating sea-level rise pose unprecedented risks, including substantial damage to complete loss of ecosystems and extinction of species (Hoegh-Guldberg et al. 2007; Wooton et al. 2008; Knutson et al. 2010; Vermeer and Rahmstorf 2009). Adverse impacts also include increasing losses from hurricanes and floods, government disaster assistance and recovery costs, insurance rates, and financial risks to public and private insurers (US GAO 2007b; Anthoff et al. 2010; Mousavi et al. 2010; Hoffman et al. 2010).

3 Methodology and survey implementation

An in-depth online survey was developed including the major challenges facing the Florida Keys.[3] The survey covered a host of issues that historically hazard-prone and increasingly strained coastal communities are projected to face as a consequence of global climate change (e.g., property loss, degraded ecosystems, impacts on tourism and insurance). Experts and decision makers serving the Florida Keys (federal, state and local government,

[1] Florida's coral reefs are the foundation of a $6 billion/year revenue stream. The Keys are the number one scuba diving destination in the U.S., in the top five worldwide. Ten million pounds of seafood and marine products are harvested annually (Donahue et al. 2008; Gibson et al. 2008).

[2] Saltwater intrusion has dramatically reduced freshwater Pine Rockland communities, critical habitat for endangered Key Deer (Ross et al. 2008).

[3] All of the Florida Keys in Monroe County, including the uninhabited Marquesas Keys (protected as part of Key West National Wildlife Refuge) and Dry Tortugas, were included in the study. The Keys in Miami-Dade County were not included, nor was mainland Monroe County.

nongovernmental/nonprofit organizations (NGO's) and private research labs), personnel working in administration and management, environmental science, emergency management, engineering, planning, zoning, etc., were asked a series of attitudinal and behavioral questions using the latest climate data and sea-level rise projections available. Survey questions consisted of multiple-choice, rating scales, check all and open-ended formats. Before implementation, the survey was extensively tested by a diverse group of experts over a 4-month period.

Following extensive research and consultation with multiple groups of local stakeholders and key informants, a list of relevant personnel were identified, and mail addresses (where available) were obtained. In total, mailing addresses of 807 experts and decision makers at local municipalities, facilities and institutions, including 11 unincorporated islands and areas (e.g., Key Largo Wastewater Treatment District), Monroe County, state and federal agencies, private research institutions, and NGO's were compiled.[4]

Experts and decision makers were requested to anonymously complete the online survey. They were contacted by mail beginning in early June (2008), and invited through a brief letter listing the survey's website to complete the questionnaire. A follow-up postcard was mailed after 2 weeks. In addition, 500 email addresses were obtained (542 email addresses from the original 807 who received mailings as well as 48 email addresses of personnel for whom no mailing address were available). Two email reminders were sent during the first and third weeks of July 2008. Of the 855 invitations, 10 requests were returned with bad addresses. Adjusted for undeliverable solicitations, the overall response rate was 26%, with 225 usable responses received over 56 days. Respondents had substantial variations in their professions and affiliations (see Table 1). The average experience of respondents (years employed in current profession) was nearly 15 years; 37% had acquired advanced degrees, 37% bachelor degrees; 59% were male, 41% female; and, 64% were over the age of 45, 83% over the age of 35 (see Table 2).

4 Survey results

We present detailed definitions and descriptive statistics of key variables from survey responses in Table 2. Responses from the first part of the survey revealed that over 90% of Florida Keys' experts and decision makers considered global climate change as real, impacts are being felt today, and impacts will be experienced in the future. A large majority of experts and decision makers were highly concerned about adverse local impacts (74%), particularly the threat of significant sea-level rise (72%), massive loss of coral reefs (74%), degraded ecosystems/habitat loss (73%), species loss and/or extinction (72%), beach loss (72%), private property loss (70%), more frequent flooding (68%), more destructive hurricanes (65%), permanent loss of public lands (63%), loss of tourism revenues (62%), and higher insurance premiums (90%).

While most experts and decision makers (86%) thought that the Florida Keys should be preparing for climate change now, over 82% reported that their respective agencies did not have an adaptation-action plan (i.e., research, planning, and regulatory policies other than greenhouse gas mitigation, energy conservation practices, etc.) to minimize adverse impacts.

[4] Experts and decision makers contacted to complete the survey were from organizations such as the National Oceanographic and Atmospheric Administration, Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Geological Survey, Army Corps Of Engineers, National Parks Service, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, South Florida Water Management District, Florida Keys Aqueduct Authority, Monroe County, City of Key West, Village of Islamorada, The Nature Conservancy, Audubon Society, Reef Relief, Mote Tropical Research Laboratory, MarineLab.

Table 1 Respondents by professions and affiliations

Profession	%	Affiliation	%
Administration, management	27.7%	Federal	9.6%
Environmental science	26.6%	State (Fl)	17.6%
Planning, zoning, permitting, code enforcement	16.3%	County (Monroe)	18.1%
Emergency management, social services	12.0%	Municipal	21.8%
Engineering, public works	8.1%	Nongovernmental Organization, Nonprofit	23.9%
Other, undeclared	9.3%	Private Research Lab	9.0%
Total	100.0%	Total	100.0%

Less than 5% of experts and decision makers reported that a plan was in place, and less than 13% reported that a plan was under construction. More specifically, less than 5% reported updating documentation of elevations (including infrastructure and roadways) and flood risk maps. Less than 5% reported modeling sea level rise projections coupled with storm surge risks; strengthening shoreline protection policies and regulations; modifying wetland conservation and restoration policies; or, incorporating climate change impact assessments in the master planning agenda. Less than 1% of Florida Keys' experts and decision makers reported participating in community discussion, outreach activities or participating in broader state or federal climate change policy initiatives. Lastly, no respondents reported conducting benefit-cost analyses for adaptation measures compared with the costs of inaction.

What accounts for this major information-action gap in a place where concern among Florida Keys' experts and decision makers is so high and the risk is documented to be so great? Evaluation of local adaptive capacity revealed that lack of resources and the absence of institutional frameworks to facilitate the adaptation process are largely to blame. Large majorities of experts and decision makers considered insufficient budget (84%), limited direction and leadership (79%) and insufficient staff time and resources (76%) as the top three constraints to adaptation.

Florida Keys' experts and decision makers underscored the need for a variety of new types of information, training, organizational and financial inputs to implement adaptation measures.

A large majority of respondents (75%) considered additional State and Federal funding and assistance highly useful to facilitate adaptation in the Florida Keys. A large majority also considered public workshops and training (72%), and better sharing of relevant expertise across departments and levels of government (71%) highly useful. A majority of decision makers ranked computational models projecting local and site-specific near term impacts highly useful (65%), the creation of a national disaster fund (64%), the creation of a Monroe County climate change task force (62%), and a database of best management practices and case-studies (61%) highly useful to facilitate adaptation in the Florida Keys.

In the second part of the survey, we presented Florida Keys experts and decision makers with a referendum for a proposed 'Community Adaptation Fund' (CAF) as a formal decision-making structure and coordinating mechanism to facilitate concrete adaptation projects and programs.[5] Experts and decision makers were told that the CAF could be used

[5] The survey-based contingent valuation method often use a similar referendum for evaluating support for diverse non-market public goods and services which are often used as inputs in benefit-cost analyses, natural resource damage assessments and other planning processes (Champ et al. 2003; Carson and Groves 2007).

Table 2 Definitions and descriptive statistics of variables used

Variable	Description	N	Mean	SD	Min	Max
Age	Respondent's age (1–6; 1. 18–24, 2. 25–34, 3. 35–44, 4. 45–54, 5. 55–64, 6. +64).	187	3.84	1.25	1	6
Gender	Respondent's gender (1 if male, 0 otherwise).	185	0.59	0.49	0	1
Education	Respondent's highest level of education completed (1–8; 1. less than 12th grade, no diploma, 2. H.S. graduate or equivalent, 3. Some college, no degree, 4. A.A. 5. B.A. or B.S., 6. M.A. or M.S., 7. Professional degree, 8. Ph D).	185	5.01	1.49	1	8
Experience	Respondent's number of years employed in current profession.	184	14.90	11.23	0	50
Profession	Respondent's profession (1–5; 1. environmental science, 2. administration, management, 3. planning, zoning, code enforcement, engineering, public works 4. emergency management, community, social services 5. Other).	184	2.60	1.33	1	5
Affiliation	Respondent's affiliation (1–6; 1. federal (e.g., NOAA), 2. state (e.g., FL Dept. Environmental Protection), 3. county, 4. NGO (e.g., The Nature Conservancy), 5. private research institution (e.g., Mote Tropical Laboratory), 6. municipal (e.g., Key West).	188	3.71	1.62	1	6
Overall impact	Respondents rate 'climate change is real and impacts are being felt today' (1–4; 1. strongly disagree, 2. slightly disagree, 3. slightly agree, 4. strongly agree).	210	3.53	0.75	1	4
Economic impact	Respondents rate the credibility of a significant sea level rise as an economic threat to the Florida Keys (0–10; 0 is Not credible at all and 10. highly credible).	207	7.55	2.84	0	10
Concern	Respondent concern about climate change in the Florida Keys (0–10; 0 is not concerned at all and 10 is highly concerned).	213	7.65	2.62	0	10
Household Concern	Respondent concern about climate change on household well-being (e.g. health, finances, property). (0–10; 0. not concerned at all and 10. highly concerned).	212	6.86	2.74	0	10
Reef loss	Respondents rate likelihood of 'massive loss of coral reefs' in the Florida Keys as a result of climate change (0–10; 0. very unlikely and 10. highly likely).	207	7.86	2.45	0	10
Flooding	Respondents rate the likelihood of 'more frequent flooding' in the Florida Keys as a result of climate change (0–10; 0. very unlikely and 10. highly likely).	206	7.34	2.60	0	10
Hurricane intensity	Respondents rate likelihood of 'more destructive hurricanes' in the Florida Keys as a result of climate change (0–10; 0. very unlikely and 10. highly likely).	207	7.17	2.47	0	10
Land loss	Respondents rate likelihood of 'permanent loss of public land' in the Florida Keys as a result of climate change (0–10; 0. very unlikely and 10. highly likely).	201	7.09	2.76	0	10
Tourism loss	Respondents rate likelihood of 'loss of tourism revenues' in the Florida Keys as a result of climate change (0–10; 0 is very unlikely and 10 is highly likely).	206	6.85	2.77	0	10
Funding assistance	Respondents rate 'additional state, federal funding assistance for climate science and adaptation' (0–10; 0. not useful at all and 10. very useful).	186	7.77	2.67	0	10
Cooperation	Respondents rate 'better sharing of expertise and discussion across departments, levels of government' (0–10; 0. not useful at all and 10. very useful).	187	7.54	2.49	0	10

Table 2 (continued)

Variable	Description	N	Mean	SD	Min	Max
Workshops	Respondents rate usefulness of 'public workshops for education and training' (0–10; 0 not useful at all and 10 is very useful).	187	7.32	2.61	0	10
Models	Respondents rate 'computational models projecting local, site-specific impacts over near-term' (0–10; 0. not useful at all and 10. very useful).	188	6.96	2.59	0	10
Resources	Respondents rate 'insufficient staff time, resources' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	187	7.65	2.39	0	10
Public demand	Respondents rate 'lack public demand for action' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	188	7.39	2.49	0	10
Budget	Respondents rate 'insufficient budget' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	186	8.46	2.45	0	10
Solutions	Respondents rate 'lack of perceived solutions' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	188	7.24	2.41	0	10
Opposition	Respondents rate 'stakeholder opposition' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	186	6.95	2.83	0	10
Partnerships	Respondents rate 'lack academic, research partners' as constraint to develop new climate change policies (0–10; 0. not a constraint at all and 10. major constraint).	185	6.90	2.74	0	10
CAF	Respondents rate support for proposed Florida Keys 'Community Adaptation Fund' (1 if Yes, for the fund, 0 if No, against the adaptation fund).	180	0.75	0.43	0	1
Room charge	Respondents rate 'surcharge on motels and hotels' to contribute to CAF (0–10; 0. not supportive at all and 10. highly supportive).	182	5.69	3.50	0	10
Toll	Respondents rate 'revenue from Overseas Highway toll' to contribute to CAF (0–10; 0. not supportive at all and 10. highly supportive).	182	5.60	3.79	0	10
Park fees	Respondents rate 'increase national, state and county park fees' to contribute to CAF (0–10; 0. not supportive at all and 10. highly supportive).	182	5.16	3.52	0	10
Rec. charge	Respondents rate 'surcharge on recreational boating and diving activities' to contribute to CAF (0–10; 0. not supportive at all and 10. highly supportive).	181	4.66	3.50	0	10
Marine charge	Respondents rate 'surcharge on commercial fishing, marine products' to contribute to CAF (0–10; 0. not supportive at all and 10. highly supportive).	181	3.90	3.32	0	10

to mobilize resources to support proactive measures to minimize the adverse effects of climate change in the Florida Keys. The CAF question was listed as follows:

> A 'Community Adaptation Fund' could mobilize resources to support proactive measures to minimize the adverse effects of climate change. Suppose that a referendum were held for a proposed 'Community Adaptation Fund'. The referendum would need a majority vote (more than 50%) to pass.

Would you vote **Yes**, for the proposed adaptation fund or **No**, against the proposed adaptation fund?

A large majority of experts and decision makers (75%) voted yes, in support of the 'Community Adaptation Fund' (CAF) in the Florida Keys. In terms of gender specific variability, 86% of females voted yes in support of the CAF compared with 66% of males. While support for the CAF was generally high across all professions and affiliations, there were some variations. Respondents working for NGO's were most likely to vote yes in support of the CAF. Among all government personal, 73% voted yes in support of the CAF (67% of federal, 83% of state, 61% of county, 79% of municipal), compared with 83% of respondents from NGO's and 65% of respondents from private research labs. Among professional groups, 73% of environmental specialists voted yes in support of the CAF, 76% of respondents in planning, zoning, permitting, and engineering, 72% of administration and management, and 70% of those in emergency management and community services coordination vote yes in support of the CAF.

Experts and decision makers were also asked to rate their support for five diverse funding mechanisms to establish the CAF. The five proposed funding mechanisms included: (1) an Overseas Highway toll (205 km long Overseas Highway links the Florida Keys with the mainland); (2) a surcharge on local motels and hotels; (3) increased national, state and county park fees; (4) a surcharge on recreational boating and diving related activities; and, (5) a surcharge on commercial fishing, marine products and other natural resource based industries.[6]

A majority of experts and decision makers (68%) supported gaining revenue from an Overseas Highway toll to contribute to the CAF (52% highly supportive and 16% moderately supportive, 32% minimally supportive). Females were more supportive of the Overseas Highway Toll (72% were supportive compared with 65% of males). As described below, this gender finding holds true for all funding mechanisms. In addition to being more supportive of the CAF, female experts and decision makers were also more supportive of funding mechanisms to establish the CAF.

A majority of experts and decision makers (71%) supported a surcharge on motels and hotels in the Florida Keys (49% highly supportive and 22% moderately supportive, 29% minimally supportive). Females were more supportive of the surcharge on motels and hotels (74% were supportive compared with 69% of males). A majority of respondents (66%) supported increased national, state and county park fees to establish the CAF (41% highly supportive and 25% moderately supportive, 34% minimally supportive). Females were more supportive of increased parks fees (68% compared with 65% of males).

A majority of experts and decision makers (59%) supported a surcharge on recreational boating and diving related activities (35% highly supportive and 24% moderately supportive, 41% minimally supportive). Females were more supportive of a recreational surcharge (66% compared with 54% of males).

Half of experts and decision makers (50%) supported a charge commercial fishing, marine products and other natural resource industries to establish the CAF (25% highly

[6] There is very limited research on financing adaptation at the local level (UNFCC 2010b). Given that adaptation is community and site specific in nature, we selected these options following consultation with local experts and decision makes at the survey pretesting level. We also attempted to provide diverse options, including both broad-based mechanisms that largely shift the financial burden away from the local community (e.g., a room surcharge at hotels and motels and an Overseas Highway toll) to more specialized targeted sectors (e.g., surcharges on boating, diving and fishing). Future research may consider alternative financing mechanisms such as additional property taxes, drinking water fees, cruise liner docking fees, alcohol taxes, etc.

supportive and 25% moderately supportive, 50% minimally supportive). Females were more supportive of a marine charge (58% compared with 45% of males).[7]

Overall, several broad-based funding mechanisms were considered more favorable than targeted user fees to establish the CAF in the Florida Keys. The Overseas Highway toll and surcharge on motels and hotels received the greatest support (approximately 50% of experts and decision makers were highly supportive of both). Experts and decision makers were relatively less supportive of increased park fees and a surcharge on recreational boating and diving related activities. The proposed surcharge on commercial fishing, marine products and other natural resource industries received the least support (50% of experts and decision makers expressed minimal support). Variations in support for these funding mechanisms across professions and affiliations was tested but revealed no consistent pattern.

5 Exploring support for financing adaptation with multivariate analysis

We ran a series of multivariate regression models to further analyze survey responses. Results from logit probability models are reported in Tables 3 and 4. The dependent variable in these models is willingness to support the proposed CAF in the Florida Keys. CAF is a binary response variable (Voted Yes, support, CAF=1; Voted No, do not support, CAF=0). The logit model was applied to analyze the likelihood of this binary response variable as a function of a set of explanatory variables, as reported in Table 2. Explanatory variables included risk perception, concern for the Florida Keys, concern for personnel health, finances and property, awareness of a variety of local ecological and socioeconomic impacts (e.g., *Overall Impact*, *Concern*, *Household Concern*, *Reef Loss*, *Land Loss*, *Hurricane Intensity*, *Flooding*), and perceptions of adaptive capacity (e.g., *Funding Assistance*, *Cooperation*, *Models*, *Workshops*, and *Resources*) to predict individual willingness to support the CAF (see Table 3). In order to test the robustness of our findings, baseline models were run with the addition of socio-demographic factors (e.g., *Age*, *Gender*, *Education*, *Experience*, *Profession* and *Affiliation*), as reported in Table 4.

In Table 3, coefficients of several variables related to risk perception and concern were found to be statistically significant in predicting support for the CAF. For example, *Overall Impact* (significant in Models 1 and 2 at 5 to 10% levels), *Concern* (significant at 1% levels in Models 3 and 4), and *Household Concern* (significant at 1% levels in Models 5 and 6) positively contributed to support for the CAF and the findings largely held after controlling for socio-demographic factors in Table 4. Ranking *Overall Impact* higher by one unit in its scale increased the likelihood of experts and decision makers' willingness to support the CAF by 9–10% (see marginal effects for Models 1, 2 in Tables 3 and 7, 8 in Table 4). Similarly, ranking *Concern* higher by one unit increased support for the CAF by 6–7% (see marginal effects for Models 3, 4 and 9, 10 in Tables 3 and 4) and ranking *Household Concern* higher by one unit increased support for the CAF by 4–5% (see marginal effects for Models 5, 6 in Table 3 and 11, 12 in Table 4).

These findings suggest that Florida Keys' experts and decision makers who think that climate change is real, impacts are being felt today and impacts will be experienced in the future, were more likely to support the CAF. Additionally, experts and decision makers who were more concerned about adverse impacts in the Florida Keys and their household well-being were more likely to support the CAF. In other words, the more experts and decision

[7] Responses for each funding mechanism were collapsed from a 0 to 10 scale into three categories (0–3 minimally supportive, 4–6 moderately supportive and 7–10 highly supportive).

Table 3 Estimated likelihood of supporting the 'Community Adaptation Fund' (CAF) (logit models)

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF	
Variable	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects
Overall impact	0.684 (0.024)**	0.098 (0.024)**	0.621 (0.057)*	0.096 (0.059)*								
Concern					0.456 (0.000)***	0.066 (0.000)***	0.430 (0.000)***	0.063 (0.000)***				
Household concern									0.302 (0.004)***	0.043 (0.001)***	0.344 (0.001)***	0.048 (0.000)***
Land loss	0.194 (0.031)**	0.028 (0.020)**							0.172 (0.060)*	0.024 (0.053)*		
Reef loss			0.173 (0.073)*	0.027 (0.078)*	0.123 (0.248)	0.018 (0.248)	0.114 (0.291)	0.017 (0.299)			0.189 (0.041)**	0.026 (0.047)**
Hurricane intensity			0.043 (0.681)	0.007 (0.680)								
Flooding			0.091 (0.388)	0.014 (0.385)								
Funding assistance	0.176 (0.084)*	0.025 (0.085)*	0.195 (0.028)**	0.030 (0.032)**			0.163 (0.075)*	0.024 (0.081)*	0.171 (0.055)*	0.024 (0.051)*	0.165 (0.054)*	0.023 (0.064)*
Cooperation	0.239 (0.016)**	0.034 (0.021)**										
Models			0.154 (0.077)*	0.024 (0.082)*			0.172 (0.068)*	0.025 (0.072)*			0.176 (0.045)**	0.025 (0.051)*
Workshops					0.198 (0.025)**	0.029 (0.036)**			0.164 (0.049)**	0.023 (0.061)*		
resources					0.197 (0.032)**	0.028 (0.027)**						
N	169		169		173		175		171		176	
Wald chi^2	38.02		45.75		40.67		42.55		33.96		38.66	
Prob > chi^2	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
Log-likelihood	−64.936		−67.779		−64.526		−65.191		−64.057		−66.370	

***, **, * imply significance at 1%, 5%, and 10% respectively; numbers in parentheses are p-values; intercept terms suppressed

Table 4 Estimated likelihood of supporting the 'Community Adaptation Fund' (CAF) (logit models including socio-demographic factors)

	Model 7		Model 8		Model 9		Model 10		Model 11		Model 12	
	Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF	
Variable	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects
Overall impact	0.784 (0.008)***	0.088 (0.011)**	0.667 (0.048)**	0.090 (0.056)*								
Concern					0.486 (0.000)***	0.064 (0.000)***	0.457 (0.000)***	0.059 (0.000)***				
Household concern									0.341 (0.002)***	0.041 (0.000)***	0.361 (0.001)***	0.045 (0.000)***
Land loss	0.173 (0.073)*	0.019 (0.053)*							0.150 (0.092)*	0.018 (0.095)*		
Reef loss			0.194 (0.086)*	0.026 (0.077)*	0.109 (0.337)	0.014 (0.331)	0.118 (0.309)	0.015 (0.307)			0.174 (0.086)*	0.022 (0.092)*
Hurricane intensity			0.020 (0.865)	0.003 (0.865)								
Flooding			0.080 (0.491)	0.011 (0.493)								
Funding assistance	0.186 (0.081)*	0.021 (0.098)*	0.200 (0.028)**	0.027 (0.030)**			0.146 (0.093)*	0.019 (0.099)*	0.175 (0.058)*	0.021 (0.064)*	0.161 (0.052)*	0.020 (0.064)*
Cooperation	0.298 (0.009)***	0.033 (0.011)**										
Models			0.209 (0.025)**	0.028 (0.028)**			0.240 (0.021)**	0.031 (0.021)**			0.233 (0.012)**	0.029 (0.016)**
Workshops					0.241 (0.013)**	0.032 (0.027)**			0.193 (0.036)**	0.023 (0.053)**		
Resources					0.156 (0.095)*	0.020 (0.092)*						
Age	0.076 (0.651)	0.008 (0.648)	−0.014 (0.944)	−0.002 (0.945)	0.006 (0.973)	0.001 (0.973)	0.014 (0.941)	0.002 (0.941)	0.044 (0.788)	0.005 (0.787)	0.022 (0.901)	0.003 (0.901)
Gender	−1.736 (0.009)***	−0.178 (0.001)***	−1.247 (0.056)*	−0.158 (0.022)**	−0.953 (0.107)	−0.119 (0.070)*	−1.067 (0.091)*	−0.130 (0.056)*	−1.429 (0.021)**	−0.158 (0.005)***	−1.109 (0.065)*	−0.131 (0.032)**
Education	0.133 (0.413)	0.015 (0.412)	−0.004 (0.981)	−0.005 (0.981)	0.098 (0.579)	0.013 (0.573)	0.101 (0.561)	0.013 (0.557)	0.193 (0.214)	0.023 (0.222)	0.113 (0.457)	0.014 (0.452)

Table 4 (continued)

	Model 7		Model 8		Model 9		Model 10		Model 11		Model 12	
	Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF		Dep var: CAF	
Variable	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects
Profession	0.380 (0.053)*	0.015 (0.412)	0.258 (0.227)	0.035 (0.241)	0.387 (0.080)*	0.051 (0.086)*	0.332 (0.121)	0.043 (0.129)	0.371 (0.048)**	0.045 (0.081)*	0.232 (0.220)	0.029 (0.247)
Affiliation	0.126 (0.384)	0.014 (0.377)	0.130 (0.398)	0.018 (0.386)	0.001 (0.995)	0.000 (0.995)	0.096 (0.517)	0.012 (0.512)	−0.025 (0.860)	−0.003 (0.860)	0.037 (0.805)	0.005 (0.804)
N	164		164		167		169		165		170	
Wald chi^2	37.07		39.55		47.33		40.89		44.17		38.79	
Prob > chi^2	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
Log-likelihood	−54.155		−59.000		−58.212		−57.538		−55.087		−58.761	

***, **, * imply significance at 1%, 5%, and 10% respectively; p-values in parentheses; intercept terms are suppressed

makers thought that climate change posed a substantial local and personal risk worthy of their concern, the greater their willingness to support the CAF. However, what triggers people's fears, worries and concerns are different for different people, including for experts and decision makers (Slovic et al. 2004; Leiserowitz 2006; Oppenheimer and Todorov 2006; Weber 2006). As previous literature describes, personal experiences, particularly recent and vivid experiences, are likely a significant driver in decision-making under risk and uncertainty (Hertwig et al. 2004; Sundblad et al. 2007; Marx et al. 2007).

Among related variables, *Land Loss* (significant at 5 to 10% in Models 1, 5 in Table 3) and *Reef Loss* (significant at 5–10% levels in Models 2 and 6 in Table 3) positively affected support for the CAF, and this is consistent after controlling for socio-demographic factors (see Models 7, 11 and Models 8, 12 in Table 4). As marginal effects indicate, ranking these local impacts (loss of public lands and coral reefs) higher by one unit in associated scales increased support for the CAF by 1–13% for *Reef Loss* and 2–3% for *Land Loss*). In other words, experts and decision makers who perceived loss of coral reefs and loss of public lands due to climate change as greater threats were more inclined to support the CAF. As discussed above, these two impacts are among the most visible signals that climate change is already underway in the Florida Keys.

Regarding experts and decision makers' perceptions of adaptive capacity in the Florida Keys a number of variables affected support for the CAF. For instance, *Funding Assistance* was found to be positive and consistently significant in most of the models reported in Table 3, 4, 5 and 6 (significant at 5–10% levels in Models 1, 2, 4, 5, 6 in Table 3 and Models 7, 8, 10, 11, 12 in Table 4). *Cooperation* was also positive and significant, though to a lesser extent (1–5% levels in Model 1, Table 3 and Model 7 in Table 4).

Regarding factors related to adaptive capacity, *Models* was positive and significant in both baseline models and (5–10% levels in Models 2, 4 and 6 in Table 3) extended models with socio-demographic factors (significant at 5–10% levels in Models 8, 10 and 12 in Table 4). The variable, *Workshops* was also positive and consistently significant in baseline (5% levels in Models 3 and 5 in Table 3) and extended specifications (5% levels in Models 9 and 11 in Table 4). Though to a lesser extent, *Resources* is positive and significant across baseline (5% levels in Model 3 in Table 3) and extended models (10% level in Model 9 in Table 4). A higher ranking of these variables (the need for models projecting local impacts, public workshops for education and training, and staff time and resources) by one unit in associated scales increased the likelihood of supporting the CAF by 2–3%.

Regarding socio-demographic variables in Table 4, *Gender* is seen to be statistically significant. Consistent with prior risk-related research (e.g. Gustafson 1998), *Gender* is found to be negative and statistically significant (1–10% levels in Models 7, 8, 10, 11 and 12). As marginal effects indicate in Table 4, male respondents are 12–18% less likely to support the CAF compared to females. Among other socio-demographic variables, variations in professions and affiliations seem to have little impact on the likelihood of supporting the CAF. *Age* and *Education* do not seem to affect the likelihood of supporting the CAF in a systematic fashion.

In Tables 5 and 6 a variety of empirical specifications based on ordered logit models are reported to investigate experts and decision makers' preferences for a diverse set of funding mechanisms to establish the CAF. The funding mechanisms included: (1) an Overseas Highway toll; (2) a surcharge on motels and hotels; (3) increased National, State and County Park fees; (4) a surcharge on recreational boating and diving related activities; and, (5) a surcharge on commercial fishing, marine products and other natural resource based industries (see Table 2 for further details on these variables). The dependent variable in each model in Table 5 is an ordered categorical variable representing experts and decision

Table 5 Estimated likelihood of supporting different mechanisms for financing the 'Community Adaptation Fund' (CAF) (ordered logit models)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Dep var: Toll		Dep var: Room Charge		Dep var: Rec. Charge		Dep var: Marine Charge		Dep var: Park Fees	
Variable	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects
Concern	0.143 (0.043)**	0.023 (0.043)**	0.167 (0.072)*	0.022 (0.063)*	0.203 (0.017)**	0.018 (0.010)***	0.007 (0.953)	0.000 (0.942)	0.287 (0.000)***	0.029 (0.000)***
Reef loss	0.119 (0.047)**	0.019 (0.060)*	0.154 (0.037)**	0.020 (0.050)**			0.175 (0.024)**	0.010 (0.057)*		
Tourism loss					−0.077 (0.252)	−0.007 (0.223)			−0.109 (0.085)*	−0.011 (0.076)*
Budget	0.185 (0.033)**	0.029 (0.029)**	0.122 (0.048)**	0.016 (0.055)*	0.168 (0.014)**	0.015 (0.023)**				
Partnerships	0.107 (0.084)*	0.017 (0.089)*								
Opposition			0.019 (0.724)	0.002 (0.725)			0.134 (0.016)**	0.008 (0.043)**		
Public demand					0.121 (0.051)*	0.011 (0.084)*				
Models							0.116 (0.052)*	0.007 (0.086)*		
Solutions									0.044 (0.504)	0.004 (0.513)
Resources									0.205 (0.002)***	0.020 (0.005)***
N	175		175		177		175		179	
Wald chi^2	29.06		31.21		27.39		27.57		21.49	
Prob > chi^2	0.0000		0.0000		0.0000		0.0000		0.0003	
Log-likelihood	−351.446		−378.927		−388.564		−369.558		−394.173	

***, **, * imply significance at 1%, 5%, and 10% respectively; numbers in parentheses are p-values; intercept terms are suppressed

Table 6 Estimated likelihood of supporting different mechanisms for financing the 'Community Adaptation Fund' (CAF) (ordered logit models including socio-demographic factors)

	Model 6		Model 7		Model 8		Model 9		Model 10	
	Dep var: Toll		Dep var: Room Charge		Dep var: Rec. Charge		Dep var: Marine Charge		Dep var: Park Fees	
Variable	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects	Coeff.	Marg. Effects
Concern	0.148 (0.045)**	0.023 (0.046)**	0.179 (0.061)*	0.023 (0.053)*	0.190 (0.047)**	0.000 (0.035)**	0.011 (0.912)	0.000 (0.912)	0.306 (0.001)***	0.030 (0.000)***
Reef loss	0.147 (0.020)**	0.023 (0.031)**	0.142 (0.057)*	0.018 (0.072)*			0.152 (0.027)**	0.009 (0.119)		
Tourism loss					−0.063 (0.383)	0.000 (0.359)			−0.126 (0.072)*	−0.012 (0.062)*
Budget	0.169 (0.047)**	0.027 (0.043)**	0.137 (0.035)**	0.017 (0.040)**	0.167 (0.019)**	0.015 (0.010)***				
Partnerships	0.090 (0.158)	0.014 (0.162)								
Opposition			0.017 (0.772)	0.002 (0.773)			0.121 (0.032)**	0.007 (0.067)*		
Public demand					0.108 (0.082)*	0.010 (0.117)				
Models							0.122 (0.044)**	0.007 (0.069)*		
Solutions									0.089 (0.220)	0.009 (0.237)
Resources									0.171 (0.015)**	0.017 (0.024)**
Age	−0.012 (0.873)	−0.003 (0.874)	−0.278 (0.017)**	−0.035 (0.022)**	−0.144 (0.177)	−0.013 (0.198)	−0.163 (0.115)	−0.009 (0.139)	−0.050 (0.620)	−0.005 (0.620)
Gender	0.332 (0.271)	0.051 (0.267)	0.106 (0.705)	0.013 (0.705)	−0.120 (0.704)	−0.011 (0.708)	−0.230 (0.459)	−0.013 (0.468)	0.419 (0.148)	0.040 (0.136)
Education	−0.116 (0.189)	−0.018 (0.201)	0.050 (0.629)	0.006 (0.622)	0.087 (0.350)	0.008 (0.329)	0.038 (0.690)	0.002 (0.681)	−0.075 (0.382)	−0.007 (0.401)
Profession	0.130 (0.261)	0.020 (0.263)	−0.038 (0.717)	−0.005 (0.716)	0.051 (0.620)	0.005 (0.615)	0.183 (0.041)**	0.010 (0.059)*	0.200 (0.075)*	0.019 (0.100)*
Affiliation	0.050 (0.556)	0.008 (0.561)	0.072 (0.383)	0.009 (0.389)	−0.005 (0.953)	−0.004 (0.953)	−0.080 (0.367)	−0.004 (0.374)	0.073 (0.392)	0.007 (0.388)
N	172		172		173		172		175	
Wald chi^2	33.59		30.95		28.43		35.27		28.63	
Prob > chi^2	0.0001		0.0003		0.0008		0.0001		0.0007	
Log-likelihood	−343.919		−367.283		−379.92973		−362.479		−381.896	

***, **, * imply significance at 1%, 5%, and 10% respectively; numbers in parentheses are p-values; intercept terms are suppressed

makers' willingness to support a funding mechanisms to establish the CAF (e.g., *Toll*, *Room Charge*, *Rec. Charge*, *Marine Charge*, and *Park Fees*; in a scale of 0–10 where 0 is not supportive at all and 10 is highly supportive). The ordered logit model is applied to analyze the likelihood of these ordinal responses as a function of a set of explanatory variables. The explanatory variables included experts and decision makers' overall concern, awareness of specific impacts projected for the Florida Keys (e.g., *Concern*, *Reef Loss*, and *Tourism Loss*), and perceptions of adaptive capacity (e.g., *Budget*, *Partnerships*, *Opposition*, *Models, Solutions*, and *Resources*).

For nearly all options (except *Marine Charge*), a higher level of *Concern* is associated with a greater degree of support for mechanisms to establish the CAF. As we see in marginal effects in Tables 5 and 6 one unit of higher *Concern* increased support by approximately 2% for *Toll*, *Room Charge*, *Rec. Charge* and 3% for *Park Fees*. In other words, experts and decision makers who were more concerned about the adverse impacts of climate change were more likely to support mechanisms to establish the CAF. A higher agreement with massive *Reef Loss* raised support for *Toll*, *Room Charge*, and *Marine Charge* (by 1–2% for a one unit higher ranking of *Reef Loss*). Respondents who perceived the threat of massive loss of coral reefs were more inclined to support the Overseas Highway toll, a surcharge on motels and hotels, and a surcharge on commercial fishing, marine products and other natural resource based industries to contribute to the CAF. Also, experts and decision makers' higher agreement that insufficient *Budget* is a top constraint to adaptation induced more support for *Toll*, *Room Charge*, and *Rec. Charge* (by 2-3% per one unit higher ranking of *Budget*) to establish the CAF.

Among other impacts, the likelihood of potential *Tourism Loss* appeared negatively related to support for *Park Fees* as a financing mechanism for the CAF. Marginal effects in Tables 5 and 6 (significant in Model 5 and 10 at 10% levels) indicate that ranking *Tourism Loss* higher by one unit decreased the likelihood that respondents were supportive of increased park fees by 1%. The finding may imply that experts and decision makers, who consider potential loss of tourism revenues in the Florida Keys due to climate change, were less likely to support Park Fees to establish the CAF. This finding may be due to the perception that increasing park fees may further reduce the demand for tourism related activities in the Florida Keys.

Several variables related to adaptive capacity tended to affect support for different funding mechanisms. *Models* was positively associated with support for *Marine Charge* (significant at 5–10% levels in Model 4 in Table 5 and Model 9 in Table 6) implying that experts and decision makers who considered models projecting local, site-specific impacts useful, were more likely to support surcharges on commercial fishing and marine products (*Marine Charge*) to establish the CAF. *Resources* was positively associated with support for *Park Fees* (significant at 1–10% levels in Tables 5 and 6) implying that experts and decision makers' increasing recognition of staff time and resource constraints, tended to positively affect support for Park Fees to finance the CAF.

Among other factors, *Public Demand* tended to positively affect support for *Rec. Charge* (Model 3 and 6 in Tables 5 and 6). Experts and decision makers, who considered lack of public demand for action as a constraint to adaptation, were more likely to support surcharges on recreational boating and diving activities (*Rec. Charge*) to finance CAF. *Opposition* was positively associated with support for *Marine Charge* (significant in Models 4 and 9 in Tables 5 and 6). Experts and decision makers who considered local stakeholder opposition a major constraint to adaptation were more likely to support a surcharge on commercial fishing and marine products (*Marine Charge*) to establish the CAF. However, regarding socio-demographic variables it is noteworthy that *Profession* was

seen to affect support for the *Marine Charge* and *Park Fees* (significant in Models 9 and 10 in Table 6) implying that preferences for funding mechanisms were different among various professional groups and lack unanimous support (as discussed above). Lastly, overall significance tests (see Wald tests in Tables 5 and 6) suggest the relevance of variables used in analyzing support for the CAF and funding mechanisms.

6 Conclusions

Experts and decision makers who are involved in coastal resource management on a day-to-day basis learn from their experiences and update their information base through an iterative process (Morgan et al. 2001; Weber 2006; Berkhout et al. 2006). Given their ability to tap reservoirs of institutional memory (i.e., ability to extrapolate from existing knowledge structures built upon previous learning), experts and decision makers' risk perceptions are likely to be more robust to detect the signal from noise in the context of climate change (Sunstein 2006; Oppenheimer and Todorov 2006; Sundblad et al. 2007; Webster et al. 2008). Compared to the general public, experts and decision makers are better equipped to make complex value judgments, (e.g., structured vulnerability assessments) to evaluate local adaptive capacity and optimal strategies to facilitate adaptation (Bostrom 1997; Smith 2003). As Fischhoff (1990) observes, "How well we manage long-term environmental risks depends on how well we understand them. Perceptions regarding… how painful their realization would be, what opportunities exist for controlling them, and [in particular] how costly control would be". Survey based research, through collecting and synthesizing experts and decision makers' inputs and opinions, can provide functional guidance for vulnerable coastal communities (Helm et al. 1999; O'Connor et al. 1999; Tribbia and Moser 2008). In terms of future research, qualitative analysis can provide supplementary information to deepen our understanding of experts and decision makers' risk perceptions as well as their willingness to support climate change adaptation initiatives.

Overall our findings suggest potential avenues for facilitating adaptation strategies that can be implemented locally. A large majority of experts and decision makers in the Florida Keys support the creation of a 'Community Adaptation Fund' (CAF) to finance proactive measures to minimize the adverse impacts of climate change. As political will and public awareness are gradually shifting on the imposing dangers of climate change, practical mechanisms are needed to reduce the information-action gap and lay the foundation for collective action at the local level. The proposed CAF can go a long way toward institutionalizing climate change adaptation initiatives. Our results suggest that experts and decision makers are willing to support diverse funding mechanisms to mobilize resources to adapt. Opinions about different funding mechanisms may provide useful information for establishing adaptation funds in other at-risk communities. For instance, experts and decision makers reported greater willingness to support funding mechanisms that are broad-based and largely shift the financial burden away from the local community (e.g., a room surcharge at hotels and motels and an Overseas Highway toll). However, they were relatively less inclined to support mechanisms targeting specialized local sectors (e.g., surcharges on boating, diving and fishing).

In 2009, both the U.S. Senate and House of Representatives proposed national adaptation initiatives within new energy and climate change legislation. The legislation called for the creation of a National Climate Change Adaptation Program, including a National Adaptation Council and a National Adaptation Fund to prepare for the

unavoidable domestic consequences of climate change (American Clean Energy and Security Act of 2009). High risk communities that are geographically (and politically) remote such as Florida Keys, may well need local resources beyond the Federal government's support (Kriesel et al. 2005). A 'Community Adaptation Fund' can provide local resources that could be matched with state and federal support.

Investment in climate science and adaptation research is "miniscule compared with the need for action at all levels" (NRC 2007). As such, climate science and adaptation research are incredibly under-funded, and decision makers lack institutional frameworks and resources necessary to implement adaptation strategies (Fabricius et al. 2007; McLaughlin and Dietz 2008; Repetto 2009; Smith et al. 2009). These constraints substantially limit society's capacity to adapt, restricting the production and dissemination of pertinent climate risk information and tools to support decision-making and risk reduction measures at the local level. As a result, adaptation is highly limited both in scale and scope (Urwin and Jordan 2008; NRC 2009). In the case of the Florida Keys, this is much less a function of lack of concern or limited risk awareness, but of limited resources. Experts and decision makers need to consider new decision-making criteria, institutional arrangements and funding mechanisms (e.g. vulnerability and resilience information, tax, subsidy and insurance policies, investment in physical and social infrastructures etc.) to secure a more sustainable future (Kunreuther and Pauly 2006; Agrawala and Fankhauser 2008; Craig 2010).

Experts and decision makers must plan for the future in ways that will ensure maximum well-being for coastal communities. This involves setting new priorities, for governments and society in general, incorporating climate risks and guiding the public and private sectors toward risk reducing measures (Bagstad et al. 2007; McGranahan et al. 2007). By learning how Florida Keys experts and decision makers are anticipating and planning for these challenges, we attempt to provide information and tools for enhancing local adaptive capacity and coastal resilience. We hope this study will provide useful inputs for understanding the near and long-term challenges regarding adaptation to global climate change in Florida and beyond.

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