

Office of the Provost and Executive Vice President for Academic Affairs



**Community Resiliency from Hurricane  
Disasters in the Bilingual and Bicultural Rio  
Grande Valley**

**Dean Kyne, Arlett Lomelí, Katarzyna Sepielak,  
Owen Temby, and Dawid Wladyka**

**A Transforming Our World Strategic Plan (TOWSP) Initiative  
Project Outcome Report**

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*Note: Author names are arranged in alphabetical order of their last name.*

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# ***Community Resiliency from Hurricane Disasters in the Bilingual and Bicultural Rio Grande Valley***

## **1. Who has worked on the project?**

1. Dean Kyne, Principal Investigator, Disaster Studies Program
2. Arlett Lomelí, Co-Principal Investigator, Sociology Department
3. Dawid Wladyka, Co-Principal Investigator, Disaster Studies Program
4. Katarzyna Sepielak, Co-Principal Investigator, Sociology Department
5. Owen Temby, Co-Principal Investigator, School of Earth, Environmental, and Marine Sciences
6. Rebecca Moran, Graduate Research Assistant, Disaster Studies MA Program
7. Kristen Kline, Graduate Research Assistant, History MA Program

## **2. Accomplishments**

### ***What are the major goals of the project?***

The major goal of the project was to develop community disaster resilience for the Rio Grande Valley, which is home to a bilingual and bicultural community of more than a million individuals. For the Rio Grande Valley (RGV) community disaster resilience is imperative as it is and has been impacted by numerous natural disasters, which include hurricanes, storm surges, and flooding. These events have been devastating for the local communities. Disaster resilience is the ability to understand vulnerability, susceptibility, and exposure to disasters, and the capacity to plan, mitigate, absorb, and recover from the negative impacts of those disasters.

Our project goals were to evaluate whether key stakeholders share their assessment of the importance of proposed variables that constitute six dimensions of the developed baseline hurricane resiliency indicators' (BHDRI). Our approach was to interview and survey key stakeholders for their agreement on measure variables proposed for BHDRI. The agreement among the key stakeholders is required before utilizing the proposed disaster resilience measurement framework for two main reasons. First, building the disaster resilience measure requires concerted efforts and commitments from key stakeholders. Due to a variety of factors in key stakeholders' lives, this may hamper the ability to participate. Second, even with an established commitment from stakeholders to building the disaster resilience measure, they also must agree upon *what* to measure.

### ***What was accomplished under these goals?***

The study was successful in accomplishing the key focus of the Transforming Our World Strategic Plan (TOWSP), namely, conducting research benefiting our bilingual and bicultural community, using methods which keep sustainability and resiliency at the forefront, and creating an inclusive climate for successful collaboration.

In particular, the study implemented the TOWSP by *engaging the community* to mitigate disasters. The group accomplished this by locating and interviewing key stakeholders from the RGV community. More importantly, the study is successful in identifying which BHDRI measure variables, of which key stakeholders share their agreement. The knowledge of agreement among the key stakeholders is important as it allows the group to measure the current status of disaster resiliency and provides the first step in upcoming future research.

The study's conceptual framework, the BHDRI, consists of six dimensions: community capital, social resilience, economic resilience, housing/infrastructure resilience, institutional capital, and environmental resilience. This conceptual framework is implemented to measure the current state of disaster resiliency in the RGV and will help

to monitor the access and evaluation of the area's disaster resilience in the future.

Furthermore, this focus and research design provides a platform to establish a positive *impact for the valley and beyond*. Once published, this group can help work towards a more formal unified consensus of the measure. With facilitating the consensus in the local community (at this stage), we will be able to study new locations and expand the project to work towards a regional consensus, establishing steps at each level to reach consensus about the measure with committed community partners.

Finally, the group was also successful in providing an *experiential learning opportunity* for two graduate students. They received training for conducting in-person interviews with key stakeholders, methods to transcribe those interviews, and insights into the field's leaders' responsibilities and perceptions. This opportunity provided research experience, networking, and insights to the field, which supports the *students' overall success* before and after graduation.

### ***What were major activities?***

During the span of the project, the group accomplished developing the baseline hurricane resilience indicators (BRHRI), completed interviewing and surveying key stakeholders to gather data, completed the analysis of the collected data, and outlined the findings of the study. We are currently working to complete the last step of the project, which is the creation and completion of manuscript for publication, and grant proposal to support further research. Below we discuss each of the activities accomplished and those in progress.

#### **(1) BHDRI Conceptual Framework Development**

The first major activity accomplished by the group's study was the development of a conceptual framework to measure disaster resiliency, based on the field's limited literature. This accomplishment is helping the field build a conceptual framework in the

area of disaster resilience studies.

## **(2) Data Collection**

The second major activity accomplished by the group was to obtain IRB approval to begin the data collection. IRB approval was first requested in February 2018 and officially obtained in April 2018. The IRB approval process took a total of 56 days. With this approval, we were able to begin and complete the data collection. This study collected both qualitative and quantitative data via in-person interviews and a survey questionnaire, respectively. Both graduate research assistants surveyed local agencies and prepared a list of potential interviewees who are key stakeholders and facilitators in managing disasters and building disaster resiliency in the Rio Grande Valley. During these in-person interviews, the graduate research assistants distributed the survey by iPad or paper form, depending on availability of internet access.

### **Interviews Conducted**

When identifying possible participants, the graduate research assistants reached out to 95 key stakeholders, by phone or email, to seeking their permission to be interviewed. A total of 31 semi-structured in-person interviews were conducted in the summer of 2018. Each interview took about 45 minutes and the research assistants transcribed the interview data.

### **Survey Questionnaire (Quantitative Data)**

The online survey instrument consisted of 19 questions: 13 measured socio-demographic variables and 6 measured the consensus on variables measuring all six of the developed BHDRI dimensions. The six questions measuring the six dimensions utilized a nine-point scale ranging from “equally important” to “extremely important” (Appendix: BHDRI Questionnaire). A total of 36 participants completed the survey. Thirty-one participants completed the survey during their in-person interview, and the remaining five received an online survey link via email for completion.

### **(3) Data Analysis**

The third activity completed by the group consisted of analyzing the data collected. The quantitative data, collected using the UTRGV Qualtrics survey tool, were analyzed using an interquartile range (IQR) method to find agreement among the respondents on six dimensions of the BHDRI. Although the majority of analysis has been completed, the process will continue until a manuscript based on this research is accepted for publication.

### **(4) Summary of Findings**

The last completed activity is outlining the findings of the study. To summarize, the study's findings indicate that participants did not fully agree on the importance of any of the proposed measure variables within the key six dimensions of the BHDRI framework (Table 1). Among the six measures, housing/infrastructural resilience ranked the highest agreement among key stakeholders with 75% of consensus among the participants. Institutional resilience followed with 57%, and social resilience with 46%. The lowest consensus of 20% was observed in the economic resilience dimension among the participants. The detailed results for each of the six dimensions are expected to be published in the planned manuscript. Below we have outlined a brief overview of each of the six BHDRI dimensions.

Table 1. A summary of consensus on key six dimensions of BHDRI framework

No.	Dimensions	Total Criteria	Meet Criteria	Percent
1	Social Resilience	13	6	46%
2	Economic Resilience	10	2	20%
3	Community Capital	7	2	29%
4	Institutional Resilience	14	8	57%
5	Housing/Infrastructural resilience	12	9	75%
6	Environmental resilience	7	2	29%

In the social resilience dimension (Appendix), key stakeholders agreed on the importance of the 6 out of the 13 measure variables (46%). Stakeholders shared agreement on the importance of the variables measuring food provision capacity, mental health support, physician access, flood insurance, individual disaster preparedness, and family health education and training programs. However, they did not share agreement on the variables, namely transportation access, health insurance, individual risk perception, pre-retirement age group, educational attainment equality, English language competency, and non-special needs such as sensory, physical or mental disability.

Within the economic resilience dimension (Appendix), key stakeholders agreed on the importance of 2 of the 10 measure variables (20%), namely, employment rate and funds available for reconstruction after disaster. However, they did not share their agreement on importance of the variables, namely, employment status, race/ethnic income inequality, business size, large retail stores, home ownership, independence on primary/tourism sector, and federal employment.

In the community capital dimension (Appendix), key stakeholders shared their agreement on the importance of 2 of the 7 measure variables (29%): community attachment and religious organizations. However, they did not agree on civic organizations, political engagement, disaster volunteerism, citizen disaster preparedness, and citizen response skills.

In terms of the institutional resilience dimension (Appendix), key stakeholder consensus was found on 8 of the 14 measure variables (57%). The 8 consensus was found were disaster aid experience, disaster plans and policies (including mitigation and evacuation emergency management plans), local disaster training, corporate insurance coverage, integrating populations with special needs into emergency planning and exercises, jurisdictional coordination, trust in governments, and integration with development policies and planning. Non-consensus measure variables were



performance regimes, institutional collaboration and coordination, mitigation spending, flood insurance coverage, proximity of county seat to nearest county seat within a Metropolitan Statistical Area, and performance regimes-state capital.

On the fifth BHDRI dimension, housing/infrastructure resilience (Appendix), key stakeholders shared agreement on the importance of 9 of the 12 measure variables (75%). These 9 consist of temporary shelter of availability, temporary short-term housing availability, sturdier housing types, medical care capacity, evacuation routes, public school restoration potential, industrial resupply potential, the application standards and regulations for buildings and infrastructure, integration of services such as transportation systems, electric power, and telephone. The remaining variables are colonias, housing stock construction quality, and high-speed Internet infrastructure.

Finally, within the environmental resilience dimension (Appendix), there are 2 of the 7 measure variables (29%) on which an agreement was reached among the key stakeholders. They are the local food suppliers and efficient energy use variables. Those the stakeholders did not agree on were previous surfaces, natural flood buffers, efficient water use, efficient drainage system, and recovery from previous disasters variables.

The study's findings indicate where key stakeholders agree on each of the 6 BHDRI dimensions based on each of the sub-measure variables. This finding helps the field identify the need for further development of the BHDRI dimensions and measure variables. Furthermore, these particular findings are to be expected as the measurement development within the field is still in the initiation phase. Based on this study's findings, we plan to continue to complete the work needed to build disaster resilience in the RGV.

#### **(5) Planned Manuscript and NSF Grant Proposal**

The final activity pending to be completed is the dissemination of the findings. The

group will complete a manuscript covering the study findings and submit the work to a peer-reviewed journal. We expect to complete and submit the final draft of the manuscript during the spring of 2019. According to the target journal, *Natural Hazards*, the first decision should be reached within 60 days of submitting the manuscript.

Following the manuscript submission, and based on the study's findings, an NSF grant proposal will be developed. The proposal draft is tentatively scheduled for the end of 2019 following the submission of the manuscript.

## ***(6) Project timeline***

Table 1. Project timeline

Activities	Start	End	Days	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19
<b>Acquiring resources</b>				<b>Milestone 1</b>																
Submitted proposal	10/17/2017	10/31/2017	14	█																
Received award	10/31/2017	11/20/2017	20	█	█															
Approved budget	11/20/2017	11/30/2017	10		█	█														
Developed a research plan	11/20/2017	12/1/2017	11			█	█													
<b>Preparing &amp; Organizing</b>				<b>Milestone 2</b>																
Completed hiring two GRAs	10/31/2017	12/8/2017	38	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Employed two GRAs for two semesters	12/8/2017	8/27/2018	262		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Completed literature review	11/20/2017	12/30/2017	40		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Completed questionnaire	12/30/2017	1/15/2018	16			█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Received IRB approval	2/6/2018	4/3/2018	56					█	█	█	█	█	█	█	█	█	█	█	█	█
<b>Data Collection &amp; Analysis</b>				<b>Milestone 3</b>																
Data collection/Interview	4/25/2018	8/27/2018	124								█	█	█	█	█	█	█	█	█	█
Transcription of interviews	4/25/2018	8/27/2018	124								█	█	█	█	█	█	█	█	█	█
Data analysis	9/1/2018	11/4/2018	64												█	█	█	█	█	█
Interpreting findings	11/4/2018	11/23/2018	19													█	█	█	█	█
<b>Disseminating findings</b>				<b>Milestone 4</b>																
Completed draft manuscript	11/23/2018	2/20/2019	89																█	█
Completed draft grant proposal	11/23/2018	2/20/2019	89																█	█
Submitted manuscript	2/20/2019	2/20/2019	0																	█
Submitted grant proposal	2/20/2019	00/00/2019																		█

Note: GRA= Graduate Research Assistant

***What opportunities for training and professional development are provided by the project?***

The project provided the graduate students with invaluable research experience with qualitative and quantitative data collection. In particular, the graduate students were able to effectively reach and interact with key community stakeholders.

The project allowed the research team to maintain and develop further ties with the local emergency management community in the Rio Grande Valley, which will benefit our students and future projects. Furthermore, based on the study's findings, an NSF grant proposal will be developed. This proposal is expected to provide further research experience and funding opportunities for UTRGV graduate students and tangible benefits for the community.

***Dissemination of results to the communities of interest***

Throughout the study, information concerning its goals and accomplishments has been disseminated through different press articles and videos to the local RGV community. These outlets have helped establish the importance of the project and its relevance to emergency preparedness in the Rio Grande Valley. As previously stated, the manuscript is currently being developed and will be submitted to a peer-reviewed journal in 2019. Moreover, in the following year, the group is scheduled to submit an NSF proposal. These upcoming dissemination outcomes will allow the research group to provide feedback to the community and develop further actions aimed at improving the hurricane disaster resiliency in the RGV.

### **3. Planned Products**

This study is expected to yield two outputs:

#### ***A manuscript in a peer-reviewed journal article.***

The research manuscript will be submitted for publication in a peer-reviewed journal, *Natural Hazards*. This journal has an impact factor of 1.901 for 2017.

#### ***A National Science Foundation Grant Proposal.***

The NSF grant proposal is scheduled for submission in 2019. This grant proposal will help fund the study's 4-phase projected plan for expansion and formal consensus on the BHDRI measures.

### **4. Impacts**

#### ***What is the impact on the UTRGV's core priority?***

The study impacted five core priorities of UTRGV. The first core priority, *student success*, was met as the study provided research assistantship opportunities to two graduate research assistants leading to promoting their success (Figure 1.A). The second, *experiential learning*, was also met as the study provided experiential learning opportunities for the graduate research assistants to learn from professionals during their interviews (Figure 1.B). The third, *research impacting the valley and beyond*, has been met as well. The study's findings on disaster resiliency has helped to initiate the discussion on the BHDRI dimensions, establishing the current local level of consensus on each measure variable. This initial stage will help provide other regional, state, and national level discussions of the BHDRI dimensions. This impact is crucial to building the disaster resiliency in the Valley and beyond (Figure 1.C). The fourth core priority met by the study, *community engagement*, was met as the graduate research assistants

engaged with community members (Figure 1.D). Finally, the fifth core priority, *health and wellbeing*, was met as the study's findings are the first step to building a consensus that will save the lives of individuals living in the RGV in the event of a disaster and could impact health and well-being of residents living in the Valley (Figure 1.E).

### ***What is the impact on the UTRGV's key areas?***

The study impacted the UTRGV's three key areas. On the first, *bilingual and bicultural community*, the study focused on the Rio Grande Valley which hosts a bilingual and bicultural community (Figure 1.F). Its development of the BHDRI dimensions will provide benefits to the community, as it will help improve the local resilience. For the second, *inclusive climate for faculty and students*, it provided promising current and future collaborations between faculty and students. These collaborations create an inclusive climate (Figure 1.G) for all to be successful in their research goals. Finally, on the third, *sustainability and resiliency*, our research helps to ensure that research on the BHDRI dimensions are able to be replicated and provided continuous knowledge concerning building hurricane disaster resiliency, making this project effective and sustainable (Figure 1.H).

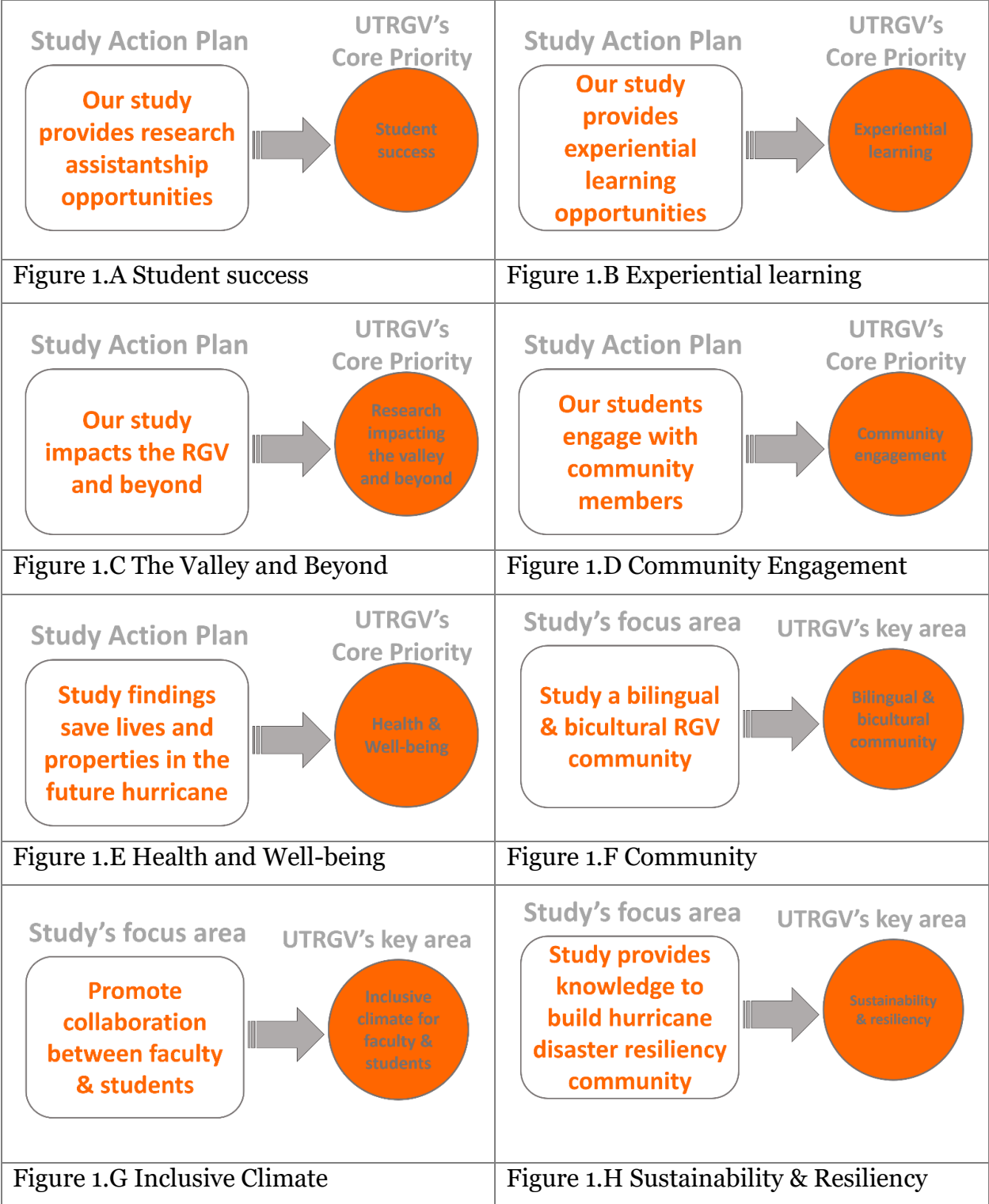


Figure 1. Study action plans focusing on core priorities and key areas of UTRGV

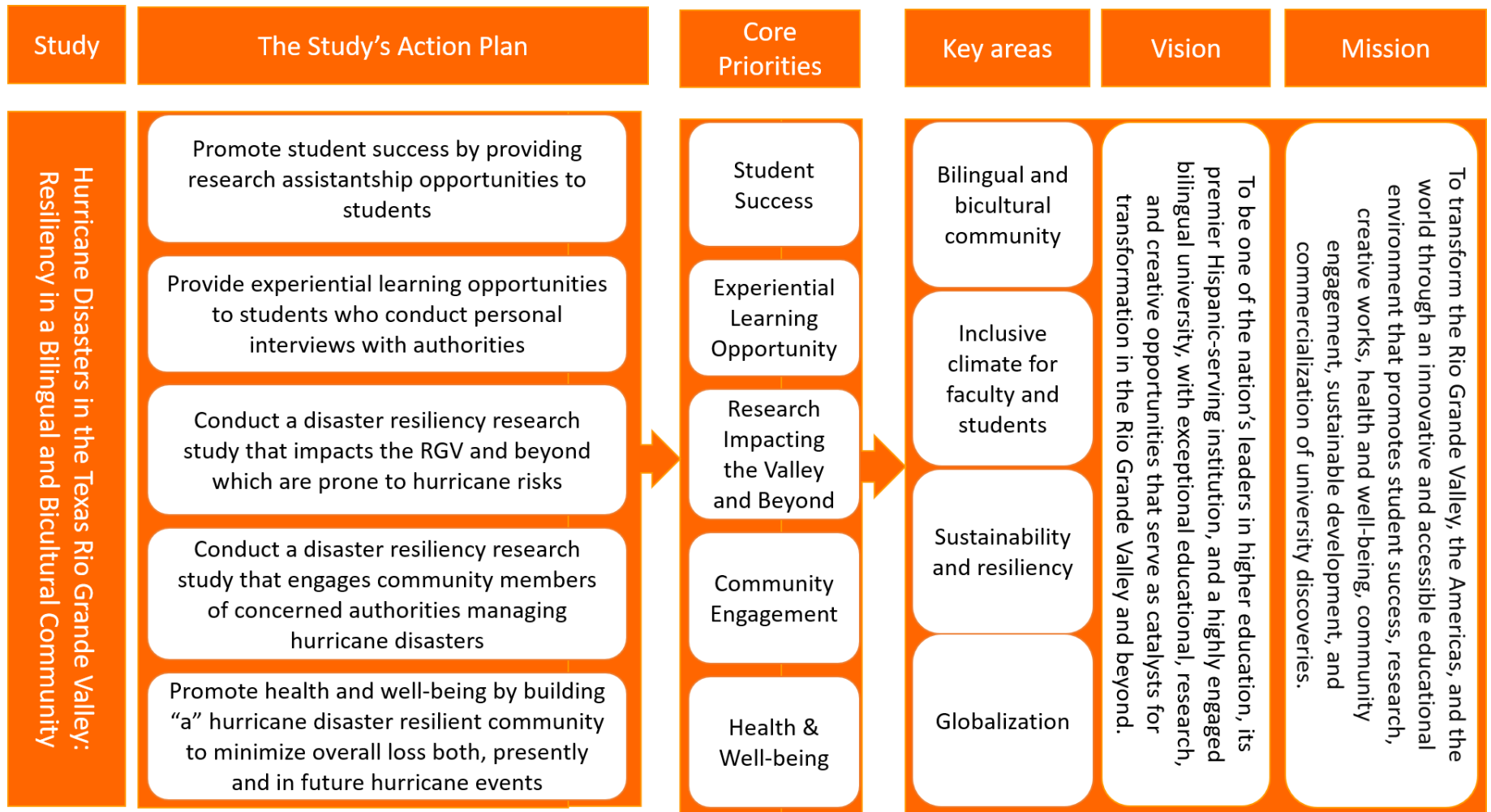


Figure 2. The study's impacts on core priorities and key areas of UTRGV's strategic plan



## **Appendix**

### **Interview Questions**

The following seven questions were asked in the interview.

1. How would you define disaster resiliency in your own perspective?
2. Do you measure community disaster resiliency? If yes, how?
3. We provided six dimensions (Economic, Social, Community capital, Institutions, Housing/Infrastructure, Environment) which one do you consider the most important? Which one do you consider the least important?
4. We provided six dimensions (Economic, Social, Community capital, Institutions, Housing/Infrastructure, Environment); would you add any further dimensions? If so, which? And why?
5. Do you think measuring community disaster resiliency is important? Why (not)?
6. Please explain why you believe it is important to measure community disaster resiliency?
7. In your opinion, how would you improve measuring disaster resiliency?

## **BHDRI Questionnaire**

Please indicate your answer choice for each of the following questions (1. Equally important, 2, 3, 4 5, 6, 7, 8, 9. Extremely important)

<b>Extremely important</b>	<b>9</b>
Very strong to extremely	8
<b>Very strongly important</b>	<b>7</b>
Strongly to very strongly	6
<b>Strongly important</b>	<b>5</b>
Moderately to strongly	4
<b>Moderately important</b>	<b>3</b>
Equally to moderately	2
<b>Equally important</b>	<b>1</b>

### **I. Social Resilience**

1. Educational attainment equality
2. Pre-retirement age group
3. Transportation access
4. English language competency
5. Non-special needs such as sensory, physical, or mental disability
6. Health insurance
7. Mental health support
8. Food provisioning capacity
9. Physician access
10. Flood insurance
11. Individual disaster preparedness
12. Individual risk perception
13. Family health education and training programs

### **II. Economic resilience**

1. Home ownership
2. Employment rate

3. Race/ethnic income equality
4. Independence on primary/tourism sector
5. Gender income equality
6. Business size
7. Large retail stores
8. Federal employment
9. Funds available for reconstruction after disaster
10. Employment status

### **III. Community resilience**

1. Community attachment
2. Political engagement
3. Religious organizations
4. Civic organizations
5. Disaster volunteerism
6. Citizen disaster preparedness
7. Citizen response skills

### **IV. Institutional resilience**

1. Mitigation spending
2. Flood insurance coverage
3. Jurisdictional coordination
4. Disaster aid experience
5. Local disaster training
6. Performance regimes-state capital (Proximity of county seat to state capital)
7. Performance regimes
8. (Proximity of county seat to nearest county seat within a Metropolitan Statistical Area
9. Corp insurance coverage
10. Trusts in governments

11. Disaster plans and policies including mitigation and evacuation emergency management plans
12. Integrating populations with special needs into emergency planning and exercises
13. Institutional collaboration and coordination
14. Integration with development policies and planning

## **V. Housing/Infrastructure resilience**

1. Sturdier housing types
2. Temporary short-term housing availability
3. Medical care capacity
4. Evacuation routes
5. Housing stock construction quality
6. Temporary shelter availability
7. School restoration potential (Public schools)
8. Industrial resupply potential (Rail miles)
9. High-speed internet infrastructure
10. Colonias
11. The application of standards and regulations for buildings and infrastructure\*
12. Integration of services such as transportation systems, electric power and telephone

## **VI. Environmental resilience**

1. Local food suppliers
2. Natural flood buffers
3. Efficient energy use
4. Previous surfaces
5. Efficient water use
6. Efficient drainage system
7. Recovery from previous disasters