



***THE DYNAMIC INTERPLAY  
BETWEEN FLOODS AND  
FINANCE***

UNIVERSITY  
OF MIAMI



COASTAL  
ECOLOGY  
LABORATORY



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Everglades Restoration coupled with Climate Change means South Florida will face more flooding events....

MIAMI HAS BEEN THERE BEFORE!

The GREAT HURRICANE hit 12 September 1926, and the  
“PANIC IN PARADISE” BANK FAILURE later that year

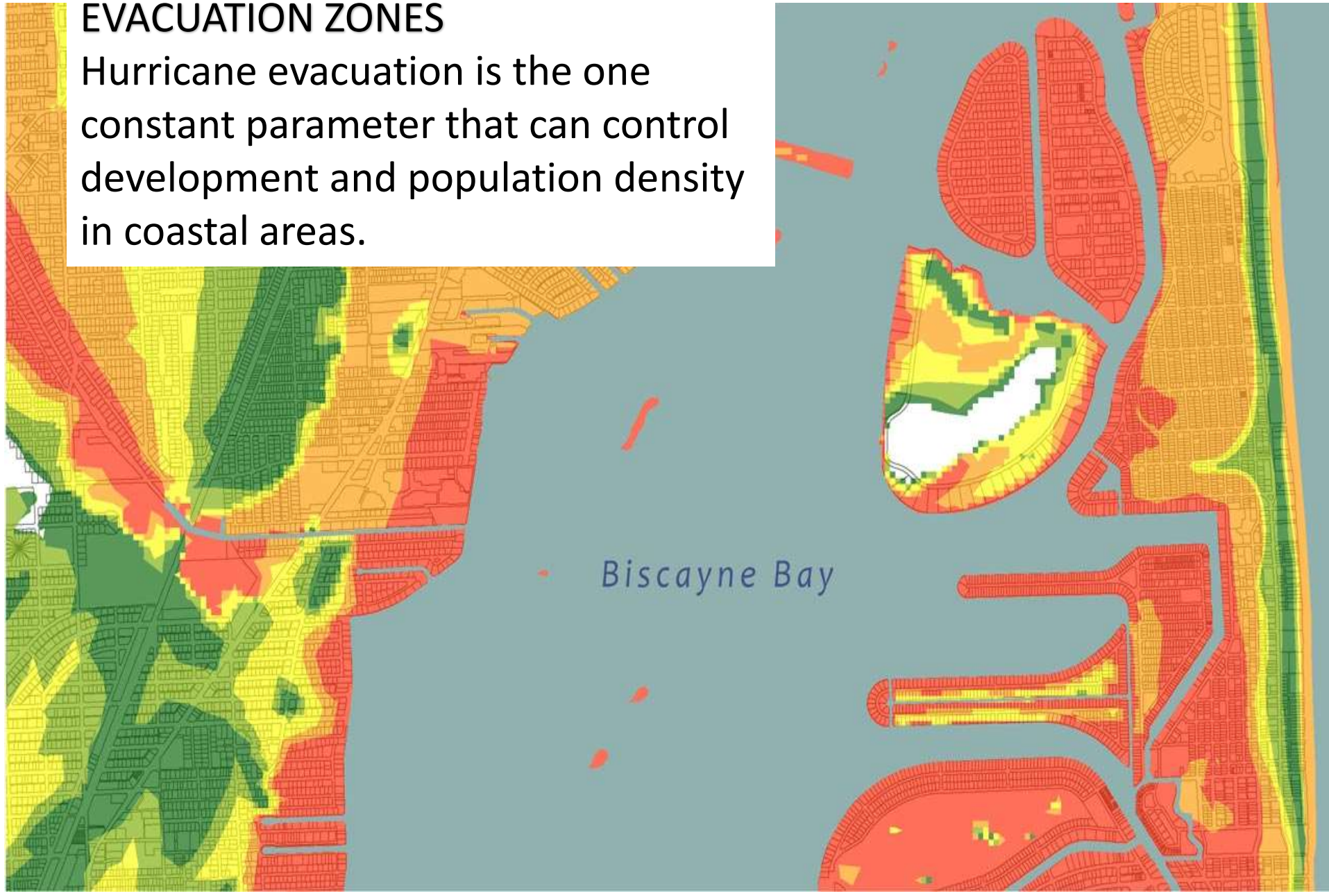


1926 Hurricane



## MIAMI FLOOD RISK MAP AND EVACUATION ZONES

Hurricane evacuation is the one constant parameter that can control development and population density in coastal areas.





But after the flood, there is a serious decision: Re-BUILD or Re-LOCATE?



***FLOOD EVENTS ARE THE RESULT OF COUPLED NATURAL-  
HUMAN SYSTEMS***



Timing, Cost, & Application  
of Available Financing and Insurance

MEDIATES

HUMAN SYSTEMS

Changes to Natural Systems  
e.g. Land Development,  
Pollution, and  
Resource Extraction

links

impact  
ecology

Impact  
finance

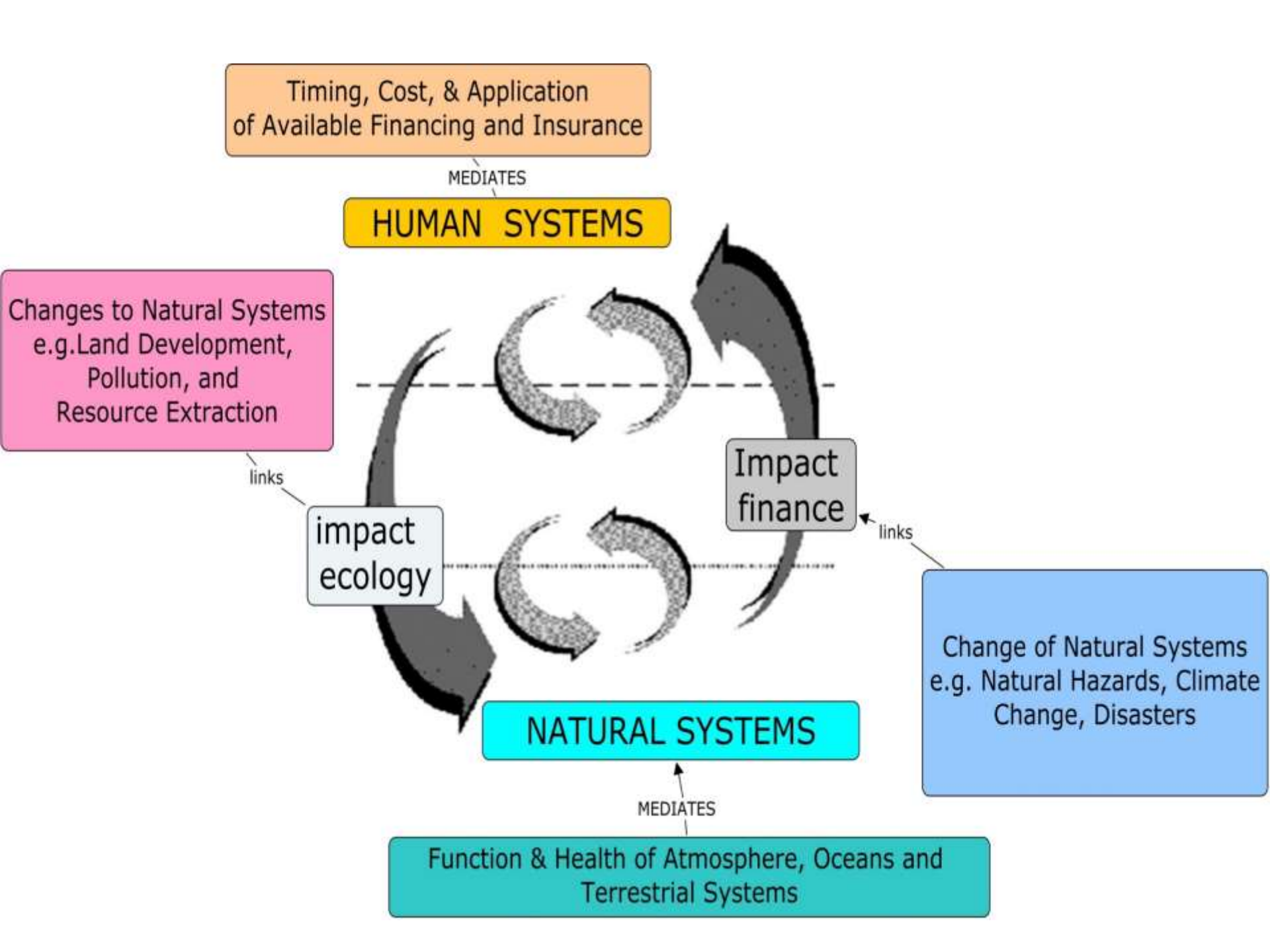
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Change of Natural Systems  
e.g. Natural Hazards, Climate  
Change, Disasters

NATURAL SYSTEMS

MEDIATES

Function & Health of Atmosphere, Oceans and  
Terrestrial Systems



# CHALLENGES of connecting Ecosystem Change under SLR conditions to the Ecology of Modern Finance



**Federal Reserve Board Policies:**  
Increase the amount of MBS purchased, and  
increase the flow of money to housing markets



**INCREASE the NUMBER  
OF MORTGAGES  
AVAILABLE**

**INCREASE DEMAND FOR  
FLOOD AND DISASTER  
INSURANCE**



**MORE HOUSING STARTS,  
MORE PRESSURE OF LAND  
USE**

**INCREASED RISK FOR  
CARRIERS IN ONE  
COUNTY OR REGION**



**MORE AGGREGATE  
MINING, MORE STRESS  
ON AQUIFER**

**INCREASED USE OF  
CATATROPHE BONDS AND  
OTHER INSTRUMENTS TO  
COVER RISK**



# *What is the connection between modern finance and flood response?*

1. A BRIEF HISTORY OF MODERN FINANCE
2. MODEL OF FINANCIAL DRIVER OF LAND USE CHANGE
3. DEBT LOAD, MOBILITY AND LIQUIDITY OF HOME OWNERS
4. AFTER A FLOOD – WHAT ARE THE OPTIONS?
5. RE-BUILD vs RE-LOCATE OUTREACH AND PLANNING FOR HOMEOWNERS

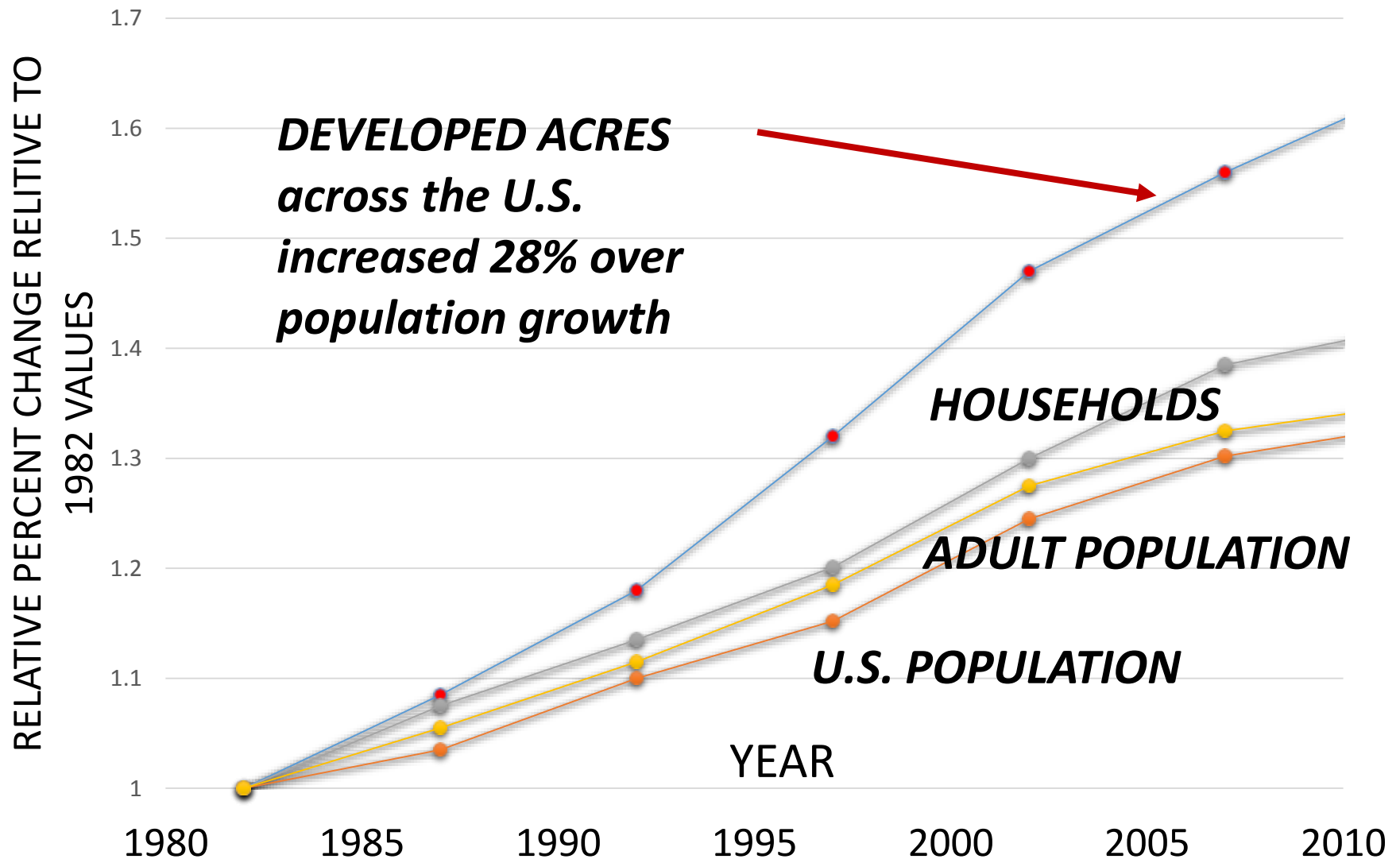
# BRIEF HISTORY OF MODERN FINANCE (What ecologists should know)

**PRIOR to 1970:** People paid cash for most items. Banks were not interested in mortgages. A profound shift occurred with legislation in 1968 to establish and promote Mortgage-Backed Securities (MBS)

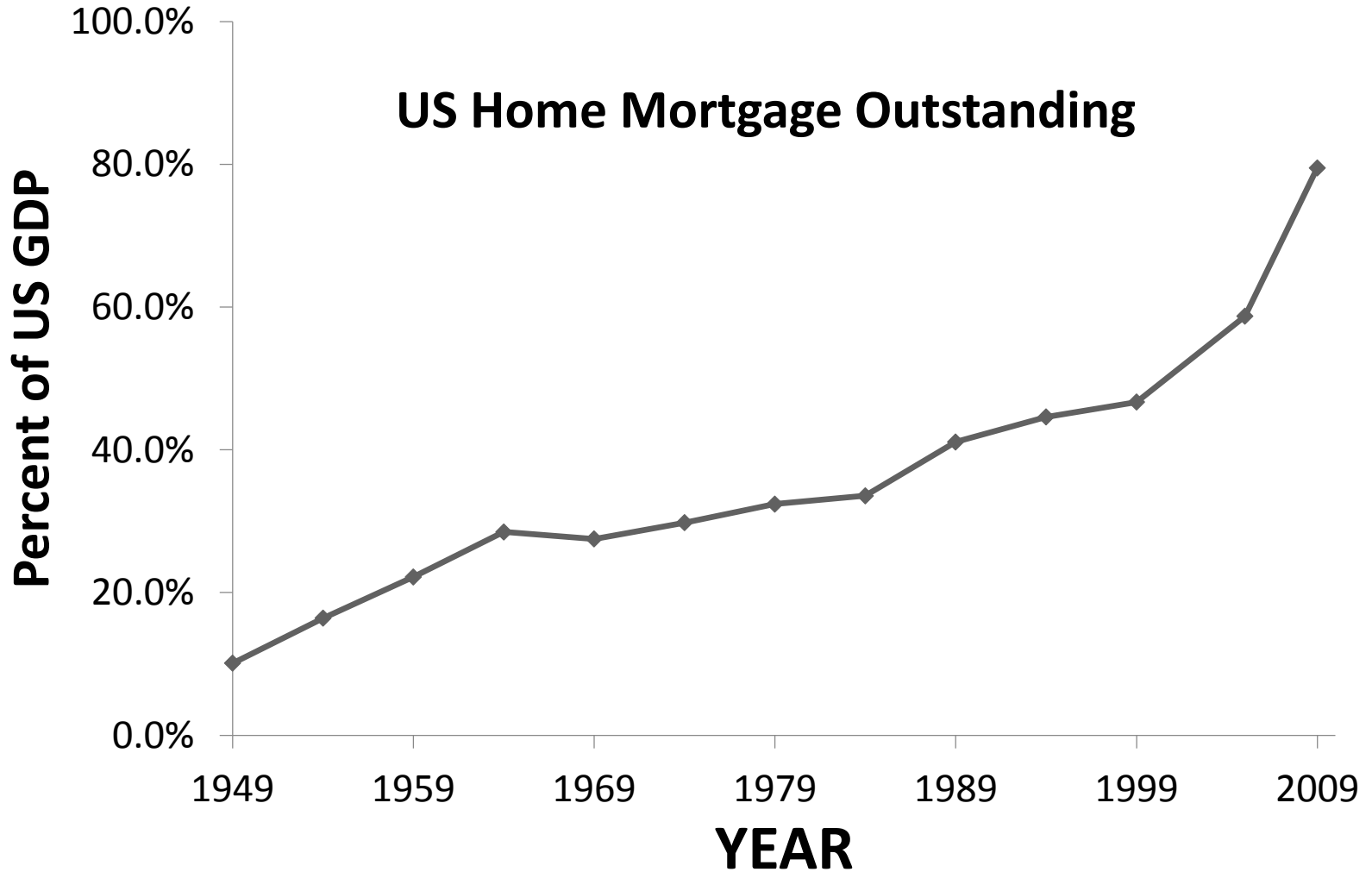
**1970 to 1982 :** Government Sponsored Enterprises (GSEs) became the guarantor and built the MBS market

**After 1983:** After Reagan-era relaxing of financial regulations, MBS were deemed as safe as treasury bonds, and an unprecedented flow of cash entered the housing market, creating more profitable instruments for investors. Home equity loans meant more items bought on credit.

# Relative increase of developed land, number of households, and adult population since 1980.



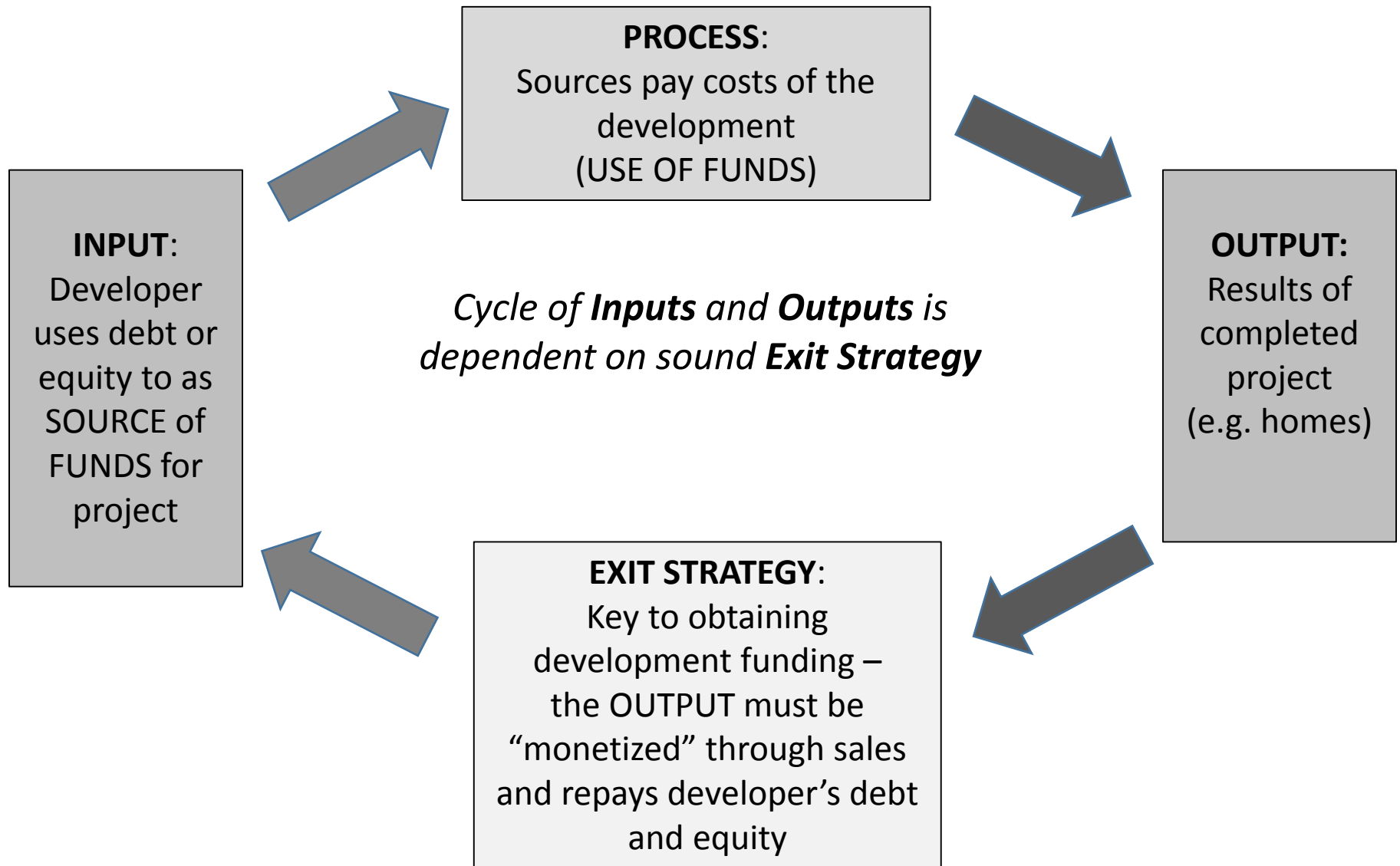
# Household debt and Increase in Mortgage debt as part of GDP.

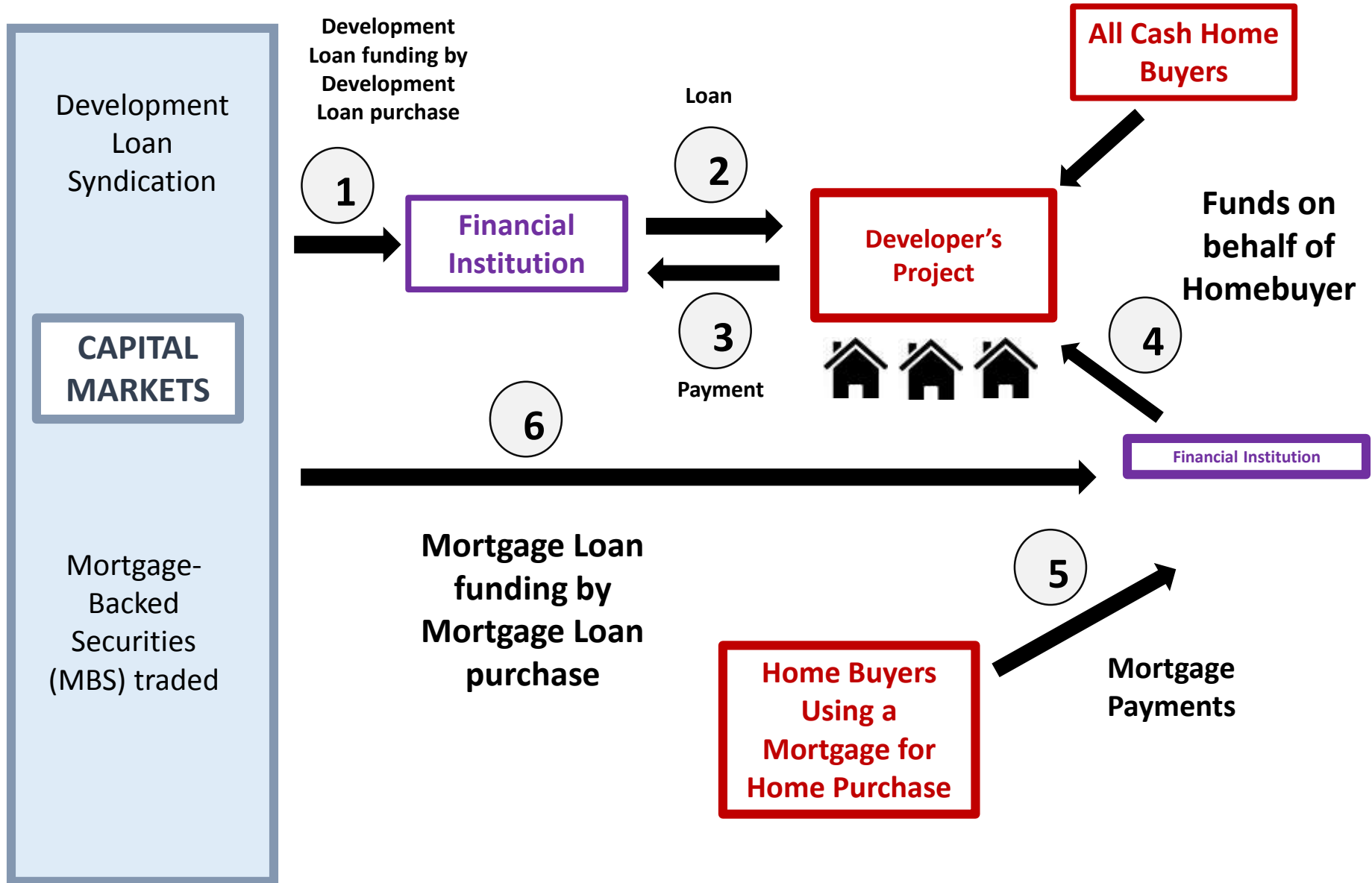


# What does this mean for South Florida?

- More of the population is moving to coastal areas
- More people have houses
- People have larger mortgages
- People are carrying higher debt loads

# Simplified Scheme of Development Funding Flow





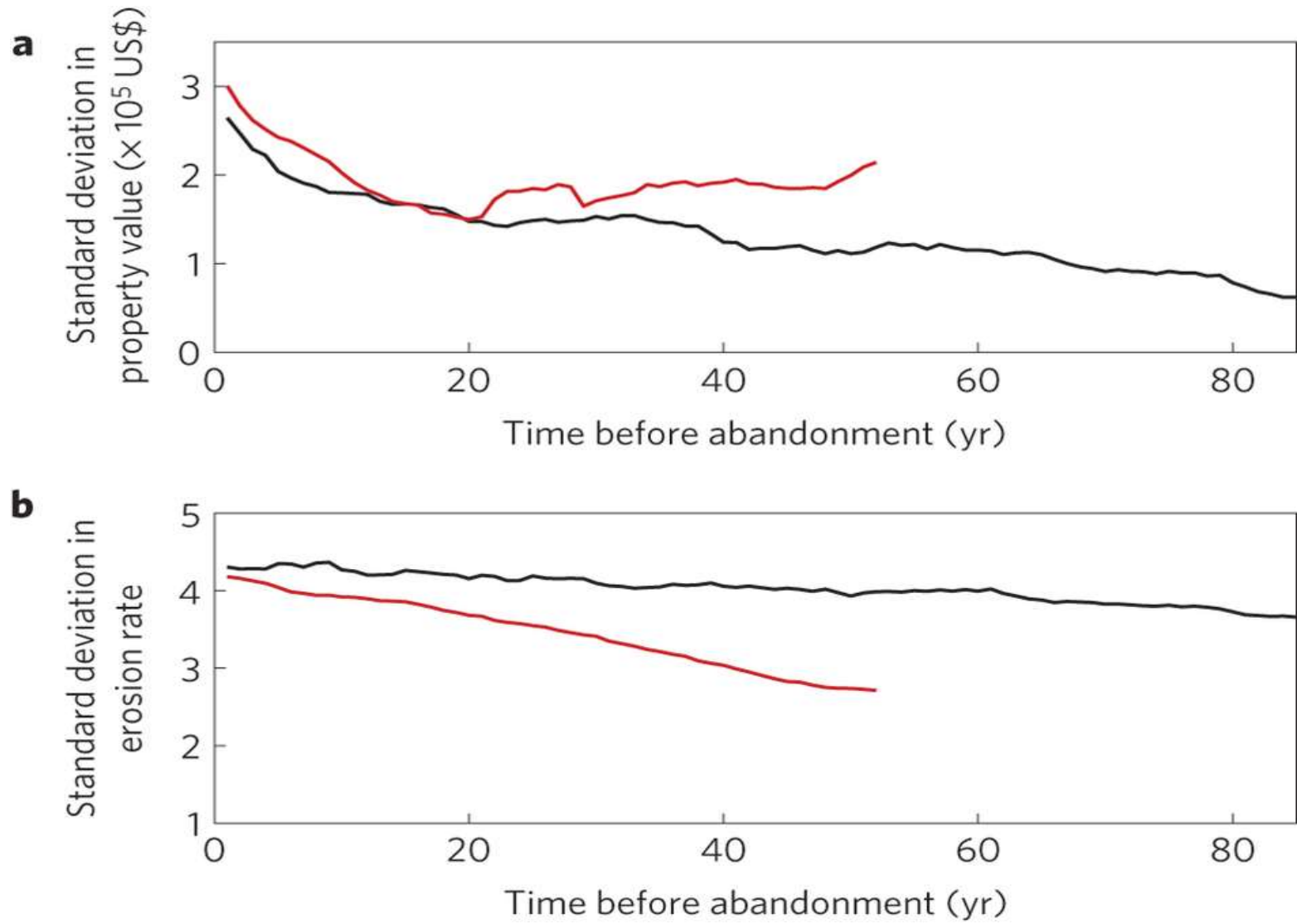




*Insurance, re-insurance, catastrophe bonds, environmental finance are novel ways for diversifying investments BUT these instruments are driven in a BUSINESS ENVIRONMENT. Environmental risks are known but poorly articulated to investors in terms of recovery and restoration costs.*

MODERN FINANCE aims to reduce risk for investments through diversification, we have all benefited from these innovations

# DEBT LOAD, MOBILITY AND LIQUIDITY OF HOME OWNERS

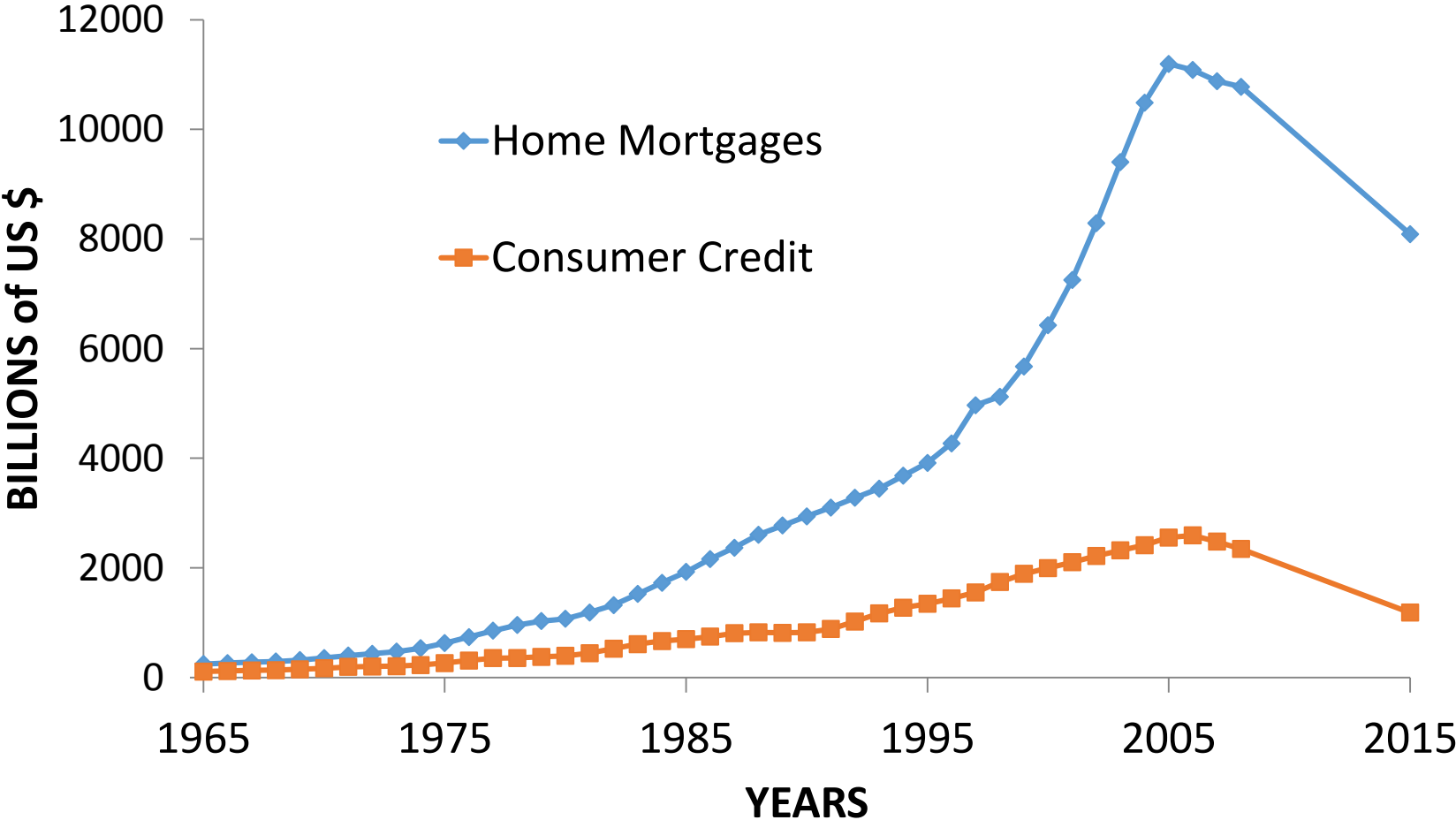


[A coupled physical and economic model of the response of coastal real estate to climate risk](#)

• [Dylan E. McNamara](#) and [Andrew Keeler](#)

*Nature Climate Change* **3**, 559–562 (2013)

# Growth of U.S. Household debt (Mortgages plus Consumer Credit) between 1965 and 2010.



“runaway credit growth feeds on itself by creating bloated, artificial demand for materials and industrial commodities that, in turn, generate shortages of capital assets like mines, ships, smelters, factories, ports and warehouses that require even more materials to construct.

In a word, massive artificial credit sets the world digging, building, constructing, investing and gambling like there is no tomorrow.”

David Stockman, on the impact of modern finance on natural resources, Contra Corner, August 2015

## AFTER A FLOOD – WHAT ARE THE OPTIONS?

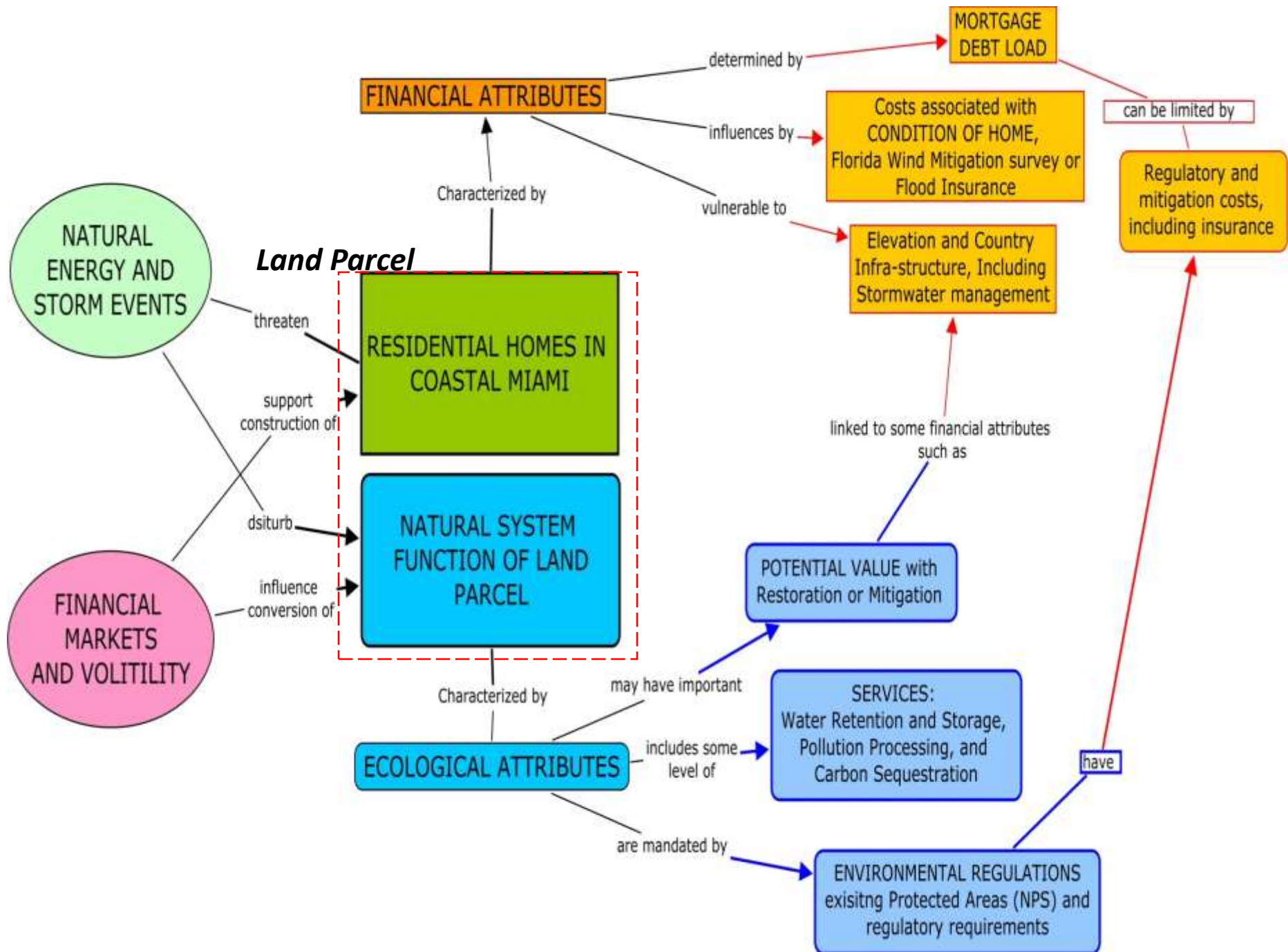
- PREPARATION IS CRITICAL, HOMEOWNERS NEED TO HAVE A PLAN
- FINANCIAL ASSESSMENT – Can I rebuild?
- ENVIRONMENTAL ASSESSMENT- Is it save to rebuild?
- ECOLOGICAL ASSESSMENT – What is the relative value of my property?



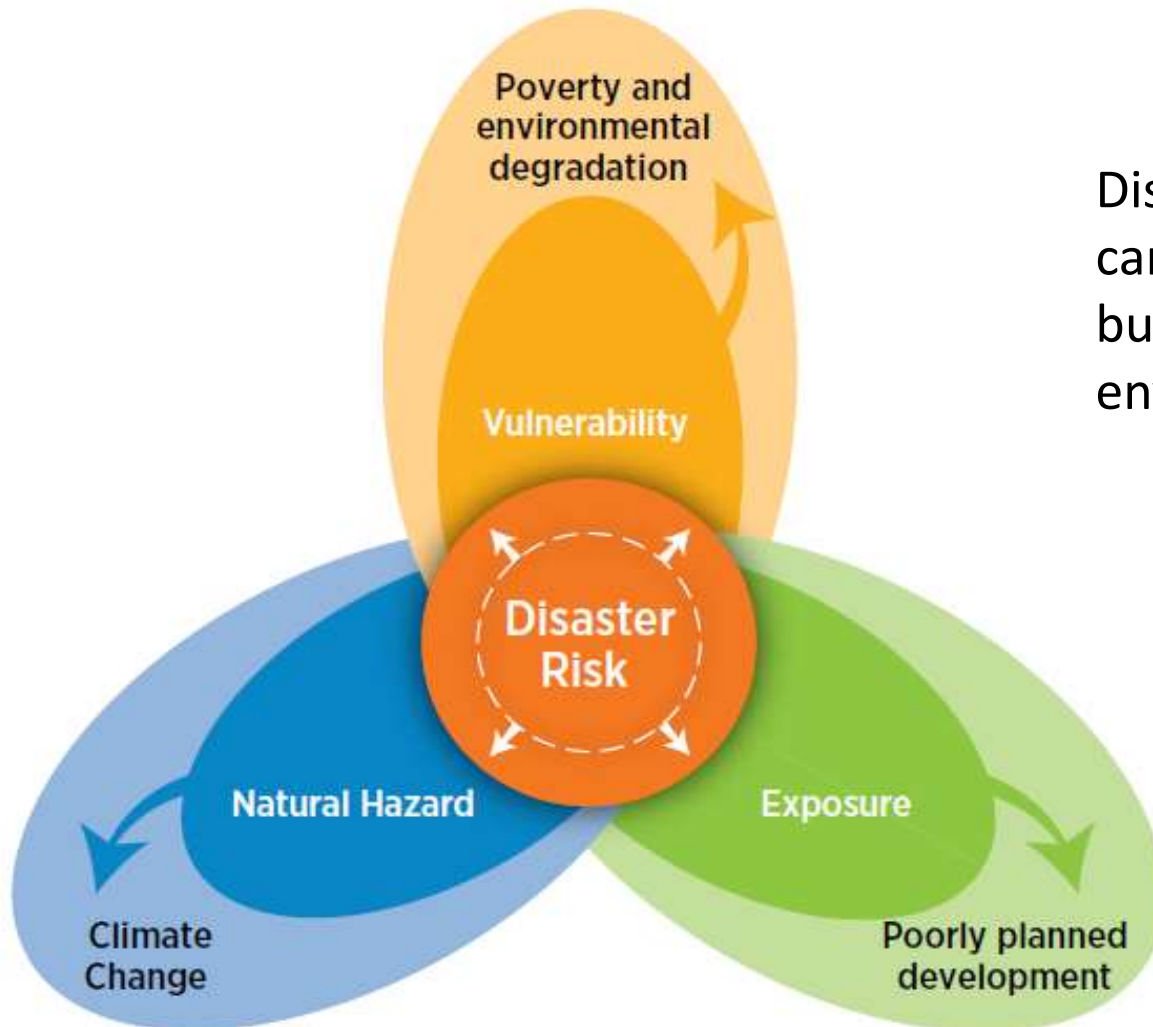
# RE-BUILD vs RE-LOCATE OUTREACH AND PLANNING FOR HOMEOWNERS

- ACCESS TO INFORMATION IS CRITICAL
- TRANSPARENCY IN FINANCIAL INSTRUMENTS
- EDUCATION AND PLANNING WORKSHOPS FOR HOMEOWNER.

*WHAT IS THE PLAN FOR COASTAL LAND USE  
FOR 40, 80 or 100 years into the future?*



WITHOUT SCARING PEOPLE, WE NEED TO BEGIN A DIALOGUE ON HOW COMMUNITIES IN MIAMI WILL MOVE, AND HOW THOSE MOVES WILL BE TRIGGERED



Disaster Risk management can not be carried out in a business and regulatory environment alone.





Thank you!

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