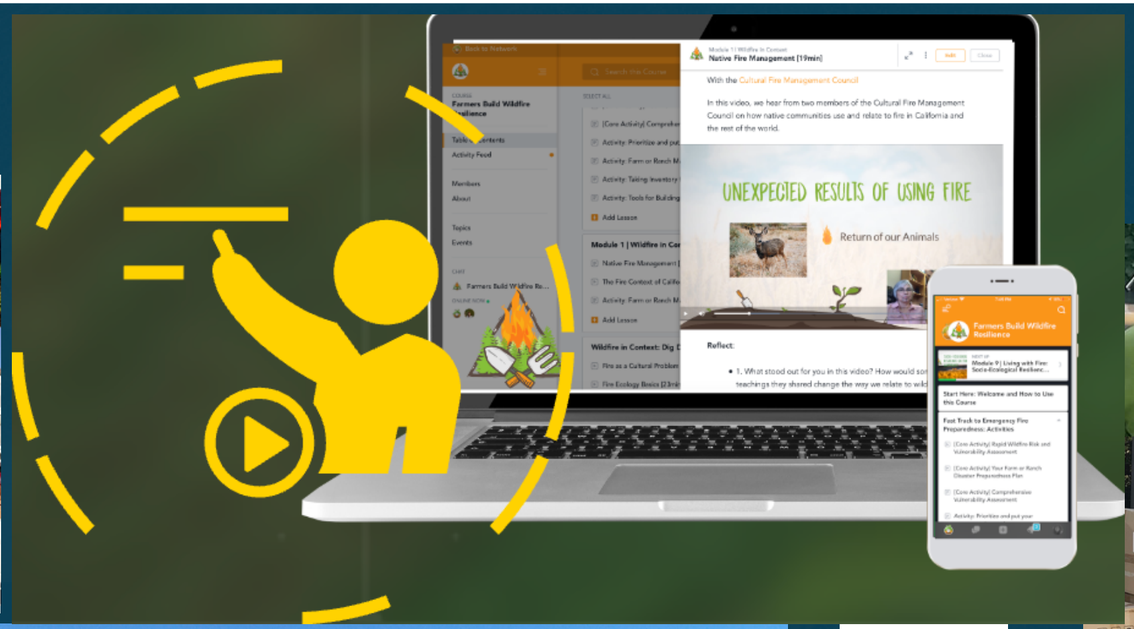
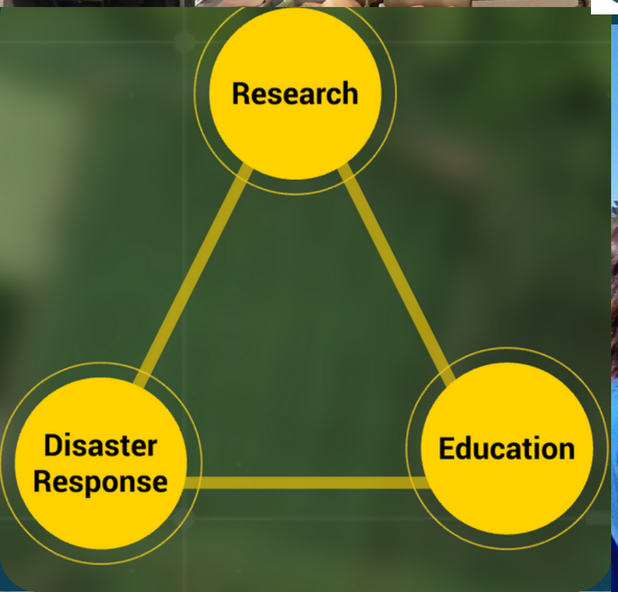
Adapting to Climate Risk through Agroecological Resilience Planning

Natalia Pinzón Jiménez

May 12, 2021 - Ag in Uncertain Times

OUR PROGRAMS

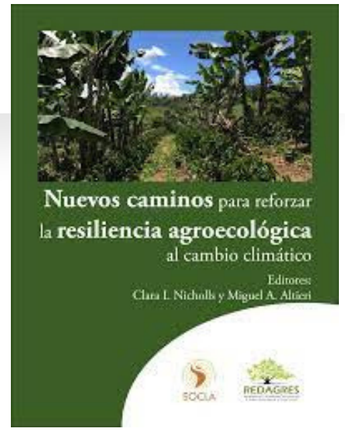


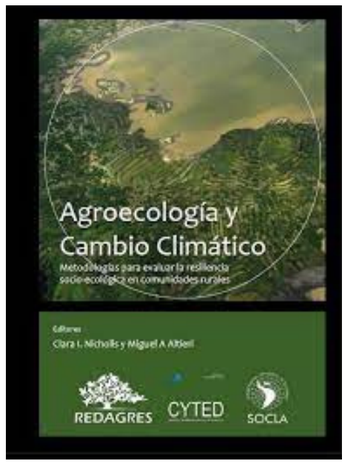


Ibero-American Agroecology Network for the Development of Agricultural Systems Resilient to Climate Change

REDAGRES

Red Iberoamericana de Agroecologia Para el Desarrollo de Sistemas Agricolas Resilientes al Cambio Climatico





Agroecology & Climate Change

Ecological

Agroecology

Economic

Social

Cropping Systems

Diversity

Genetic

Landscape

Markets

Workforce

Risk

Damage Level

Climate Threat

Frequency
Intensity
Duration

Vulnerability

Landscape Matrix
Vegetation Matrix
Soil cover and SOM
Slope, exposure, etc

Response Capacity

Farmer's Knowledge
Management Skills
Access to resources
Diversity of enterprises, etc.

Adapted from: Altieri, Nicholls et al 2015
Didactic toolkit for the design, management and assessment of resilient farming systems

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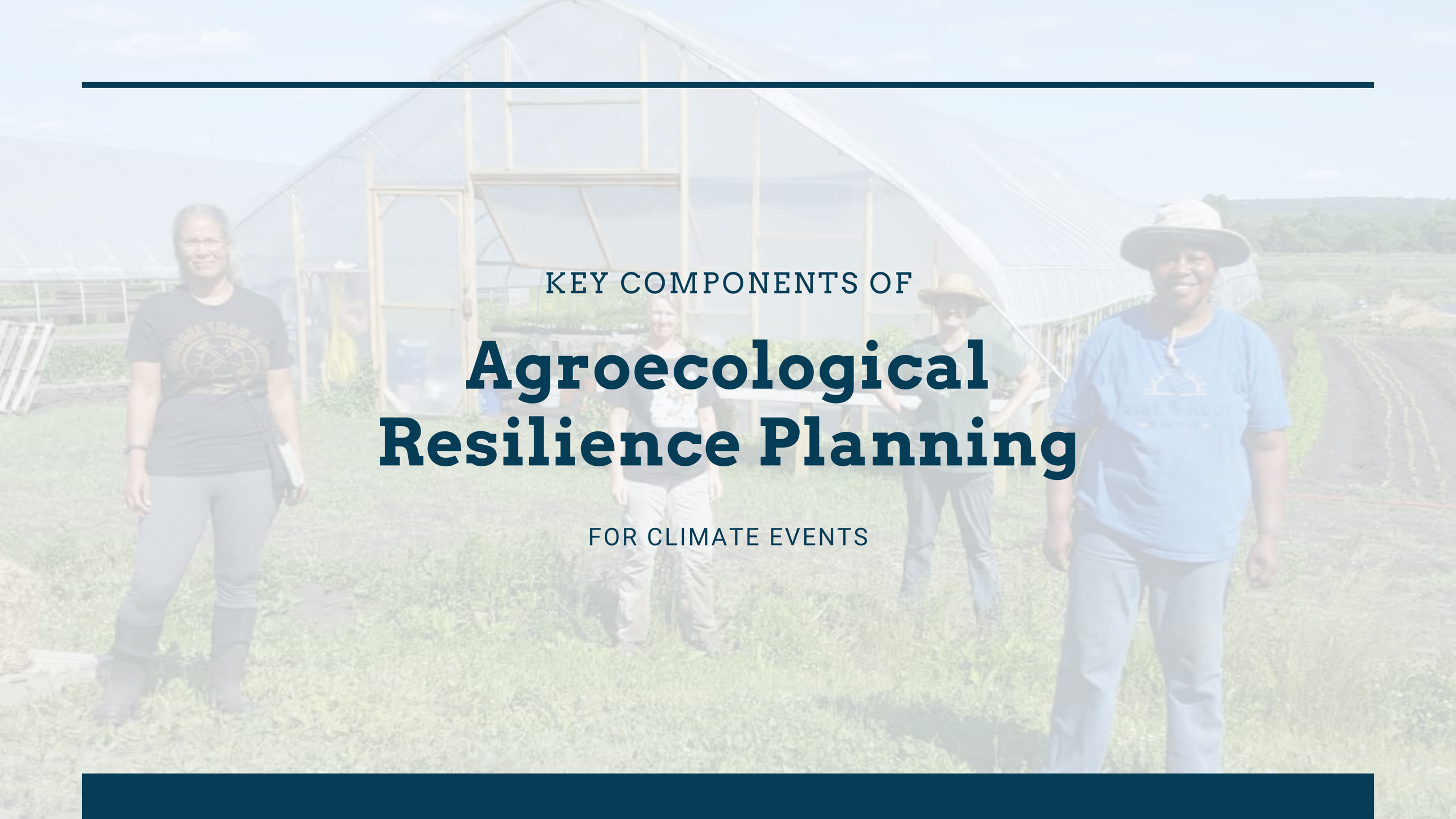
$$\text{Risk} = \frac{\text{Vulnerability} \times \text{Threat}}{\text{Response Capacity}}$$

CLIMATE

RESILIENCE

FOR CLIMATE EVENTS

The capacity to
withstand and **recover**
from a climate extreme event



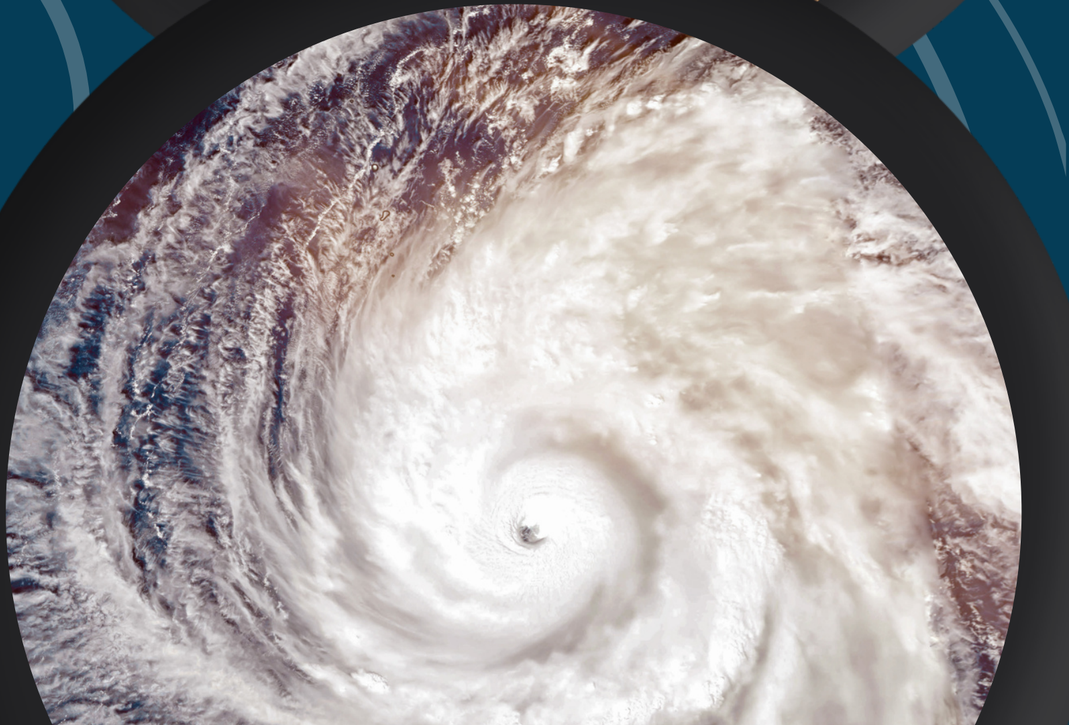
KEY COMPONENTS OF

Agroecological Resilience Planning

FOR CLIMATE EVENTS

Step One: Identify Threat and Impacts

THROUGH LOCAL KNOWLEDGE, RESEARCH AND CLIMATE TOOLS

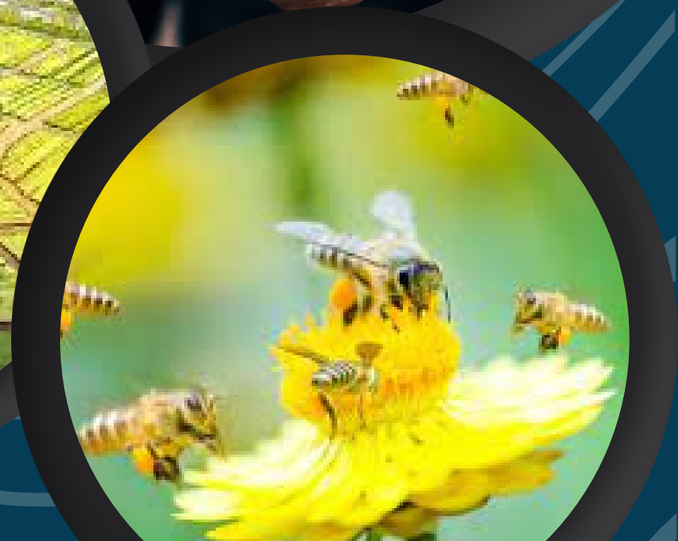


Step Two: Identify Indicators of Vulnerability

ACROSS THREE DIMENSIONS

Ecological Indicators

SOIL HEALTH | SOIL COVER | SOM | SOIL DISTURBANCE | DIVERSITY | CROP VARIETIES | WATER HARVESTING | BIOLOGICAL CORRIDORS | SURROUNDING LANDSCAPE | TOPOGRAPHY | INPUT DEPENDENCY...



Ecological Indicators of Drought Risk

Indicator	Description	Valuation	Score
Crop diversity	**Monoculture**: only one crop species grown	High vulnerability	4
	Only **2 crop species** grown	Medium vulnerability	3
	Between **3-4 crop species** grown	Low vulnerability	2
	More than 5 crop species grown	Very low vulnerability	1
Genetic diversity	**Monoculture**: only one variety of each crop	High vulnerability	4
	2 varieties of each crop	Medium vulnerability	3
	3-**4 varieties** of each crop	Low vulnerability	2
	More than **5 varieties of** each crop	Very low vulnerability	1
Soil quality	< Than 1 % organic matter content, soil 100% uncovered	High vulnerability	4
	Between 2-3 % organic matter, 30-50% soil covered	Medium vulnerability	3
	4 to 5 % organic matter, 50-70 % soil covered	Low vulnerability	2
	> 5 % organic matter, > 70% soil covered with mulch or other materials	Very low vulnerability	1

Economic Indicators

MARKET DIVERSITY | MARKET TURBULANCE | ACCESS TO LOANS, CREDIT, CAPITAL , INSURANCE | DEPENDENCY ON EXTERNAL INPUTS | LAND TENURE | LABOR ....

Social Indicators

KNOWLEDGE AND SKILLS | SOCIAL COHESION AND ORGANIZATION | KINSHIP NETWORKS | INSTITUTIONAL SUPPORT | LANGUAGE AND CULTURAL FLUENCY | IMMIGRATION STATUS ....

Step Three: Take a Pulse of the Farm

USING FARM FRIENDLY INDICATORS

Integrated Assessment Framework

FOR DROUGHT RISK OF SMALL-SCALE PRODUCERS IN CALIFORNIA

VULNERABILITY INDICATORS

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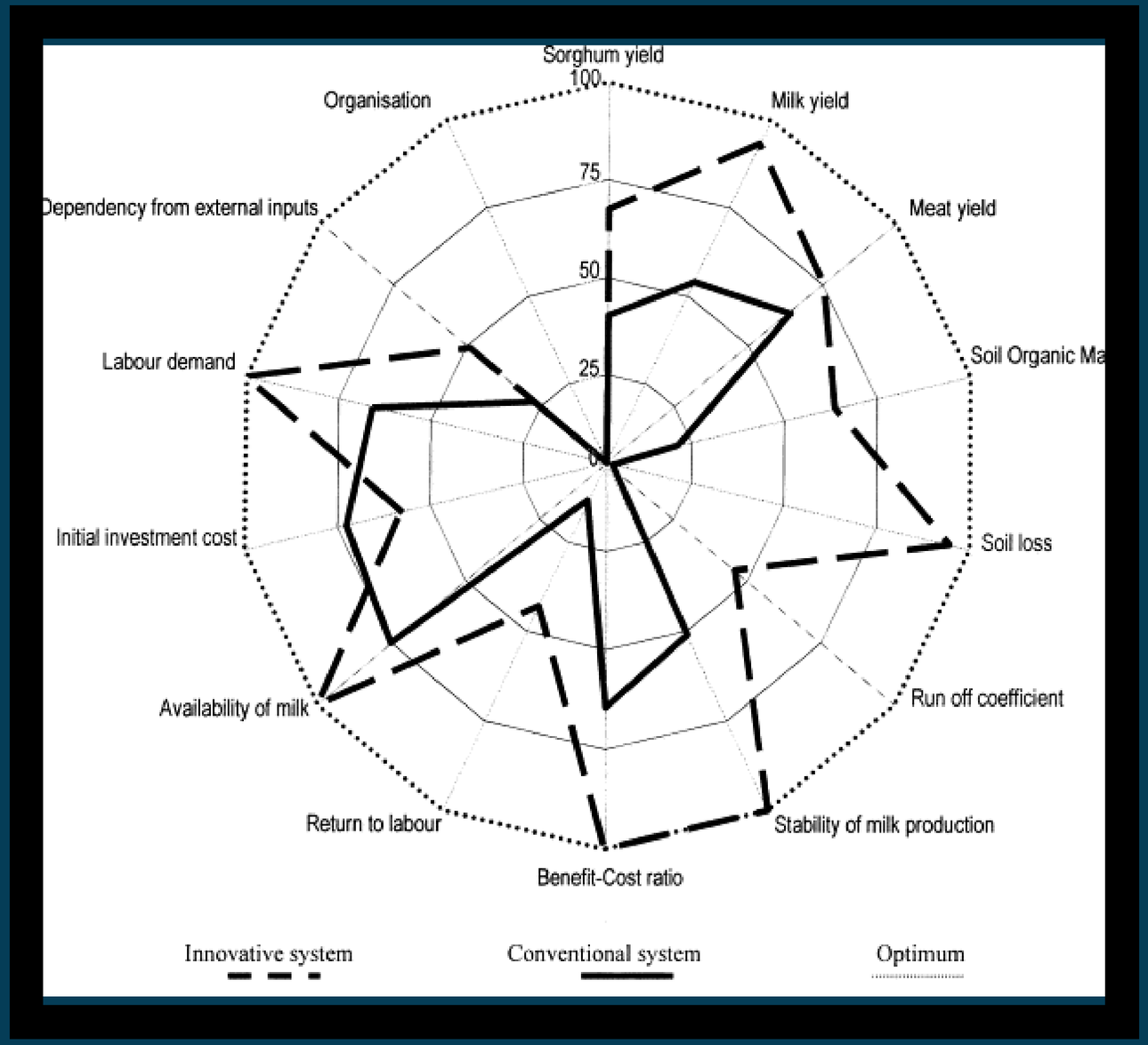
Water use and conservation	No irrigation, no water conservation in practices, soil dries quickly	High vulnerability	4
	Limited access to irrigation, little water conservation practices, soil dries but not so quickly	Medium vulnerability	3
	Access to irrigation, at least one water conservation practice, the soil remains humid for a few days	Low vulnerability	2
	Unlimited access to irrigation, more than two water conservation practices, the soil remains humid for several days	Very low vulnerability	1
Land Tenure	Short term lease (10 years and below)	High vulnerability	4
	Medium-term lease (10 - 20 years) or farming land with a purchase agreement and plan	Medium vulnerability	3
	Long term lease (30+ years) and/or farming on land which is in a farmland trust	Low vulnerability	2
	Own or co-own farmland	Very low vulnerability	1
Markets	Single market which is vulnerable to global fluctuations	High vulnerability	4
	At least one type of direct market	Medium vulnerability	3
	Multiple (more than two) regional direct-market types	Low vulnerability	2
	Multiple (more than three) regional direct-markets types	Very low vulnerability	1

RESPONSE CAPACITY INDICATORS

Indicator	Description	Valuation	Score
Knowledge and skills	No knowledge about adaptation practices	Very low response capacity	1
	Limited knowledge about adaptation practices, few management skills on how to react to the threat (eg. drought)	Low response capacity	2
	Basic knowledge of adaptation practices, some management skills to deal with the threat (eg. drought)	Medium response capacity	3
	Sufficient knowledge about adaptation practices, and skills on how to manage the farm when affected by the threat (eg. drought)	High response capacity	4
External inputs dependency	More than 90% of inputs (water, fuel, fertilizer, mulching material, etc.) come from outside the farm	Very low response capacity	1
	Between 50-90% of inputs come from outside the farm	Low response capacity	2
	Between 20-50% of inputs originating outside of the farm	Medium response capacity	3
	Less than 20% of inputs come from outside the farm; and farmers are relatively free of debt and have low dependency of markets	High response capacity	4
Social cohesion and organization	Farmers do not belong to a social organization or community network	Very low response capacity	1
	Farmers occasionally join farmers groups or networks	Low response capacity	2
	Farmers participate 50% of their time in networks of mutual help	Medium response capacity	3
	Farmers organized in cooperatives or community groups for mutual help and collective action, with 100% participation	High response capacity	4
Institutional support	No support from outside institutions	Very low response capacity	1
	Occasional support from outside institutions	Low response capacity	2
	Some access to external support	Medium response capacity	3
	Farmers obtain steady support in the form of crop insurance, loans, credit, extension services, technical advice, etc.	High response capacity	4
Ecological services	Farmers don't use practices that provide ecological services (i.e. soil water storage) thus crops do not withstand drought impact	Very low response capacity	1
	Farmers rarely use practices that provide ecological services	Low response capacity	2
	Farmers use one or more practices that enhance ecological services and crops exhibit medium tolerance to drought	Medium response capacity	3
	Farmers can rely on the soil and plant management practices they use for their crops to withstand and recover from drought	High response capacity	4
Labor	High dependance on a temporary and vulnerable labor populations (migrant workers); or on highly-specialized labor; or on volunteer labor	Very low response capacity	1
	Access to a diversity of labor pools including back-up family labor and ability to keep workers year-round.	High response capacity	4



Taking a "Pulse" of the Agroecosystem's Vulnerability

Step Four: Write a Plan

IDENTIFY SHORT, MEDIUM AND LONG TERM ACTIONS THAT REDUCE RISK

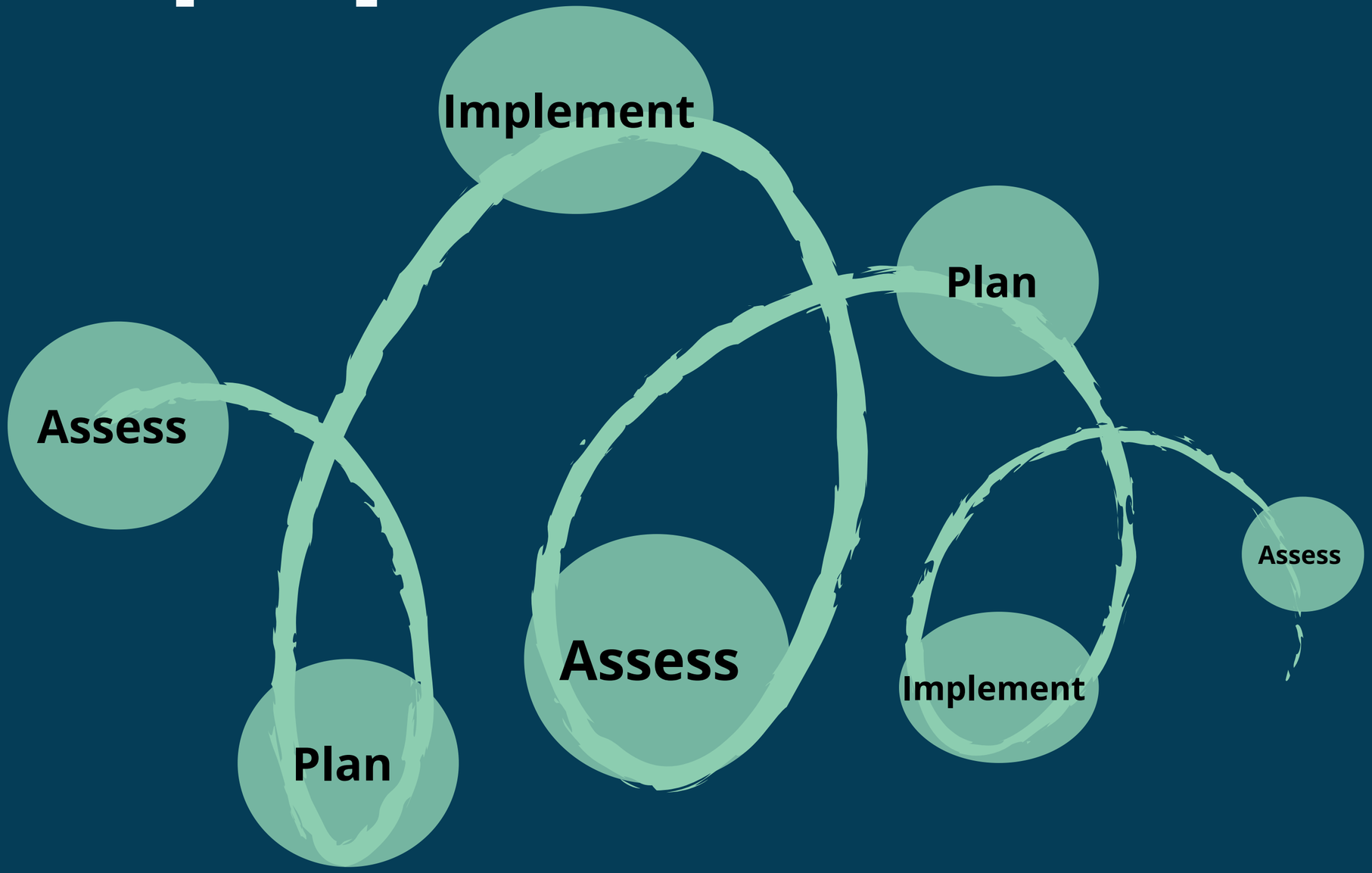
STRATEGIES AND ESTIMATED COSTS			
Strategies and Related Indicator(s)	**Short Term: 1-5 years**	**Medium Term: 5-10 years**	**Long Term: 10+ years**
Example: Hedgerows	*(year 1) Site selection, plan, design hedgerow. (year 2) Secure funding for hedgerow Cost: 15 hours*	*Plant hedgerows upwind of the farm, 1000 feet Estimate cost: $4,000 and 80 hours*	
Example: Cover Crops		*Plant perennial, drought tolerant cover crops in all grazing areas:*	
Example: Variety selection for future climate scenario	*Participate in a local plant breeding program for one crop variety Cost: 30 hours, 0.25 acres, $200 dollars*		

Step Four: Write a Plan

IDENTIFY SHORT, MEDIUM AND LONG TERM ACTIONS THAT REDUCE RISK

WHAT	HOW	WHEN	COSTS
High priority actions that are not yet complete	Specific actions I will take	Timeframe for completion	Estimated costs in time or money
Create defensible space around barn		1 month	2 days with 2 crew members
Social resilience	Participate in regional wildfire ready networks	3 years	attend monthly meeting

Iteratively Repeat



- Potential fire magnitude
- Slope and landscape
- Adjacency to WUI
- Fire regime and fire history
- History of evacuations and smoke
- Expected loss

- Surrounding forest Landscape
- Emergency preparedness
- Fire risk: infrastructure, home and forest
- Mutual aid networks
- Market context

- Financial safety-net
- Knowledge of response and recovery
- Social networks
  - Agency relationships
  - Family and friends
- Back-up Systems
- Personal Capacity
- Workforce Preparedness

Threat

Vulnerability

Response Capacity

RISK

Holistic Risk Assessment

Scales of SocioEcological Resilience

1. Individual Scale
2. Farm Scale
3. Enterprise Scale
4. Multiple Farm Scale
5. Network Scale
6. Public Scale

Diversity, Flexibility and the Resilience Effect, Carlisle 2014


Transfomative
RESILIENCE

Thank You!

Thank you to our funders...

Thank you to research advisors: Dr. Clara Nicholls, Dr. Miguel Altieri and Dr. Ryan Galt

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