

4R Nutrient Stewardship

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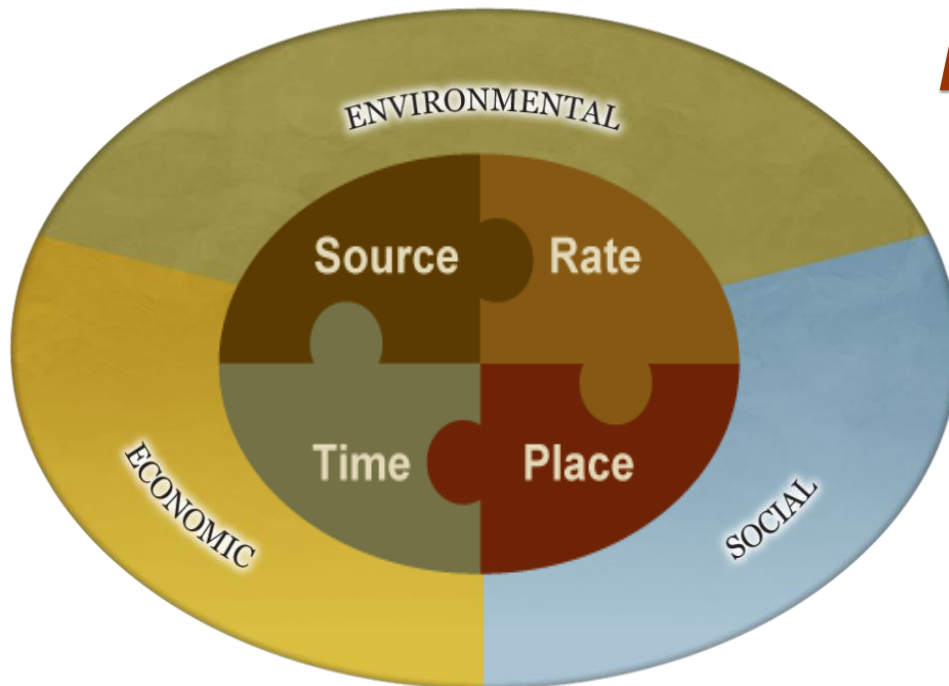


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4R Nutrient Stewardship

- Technical start- 1980's; as a process in 2007 (Brussels)
- A science-based approach that offers increased production, enhanced environmental protection, increased farmer profitability and improved sustainability
- Recognizes that sustainable nutrient use must support cropping systems that provide economic, social and environmental benefits

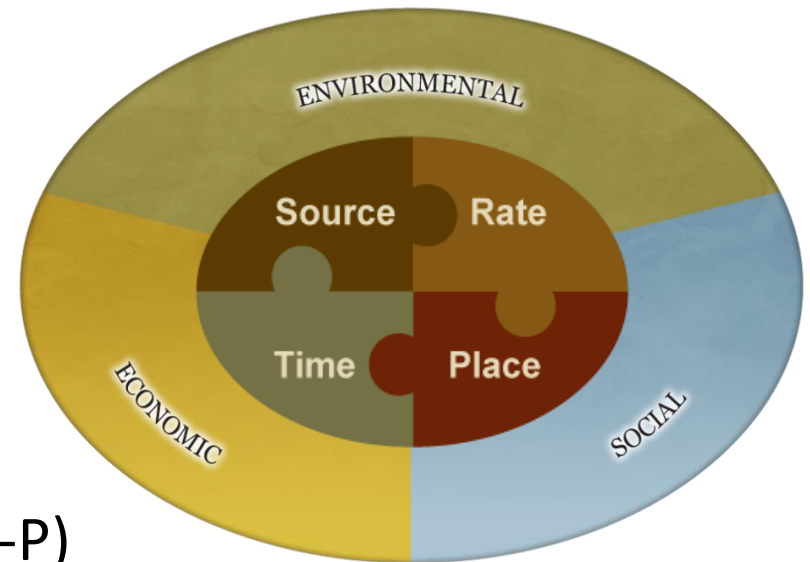


***Right Source @ Right Rate,
Right Time, Right Place***

***4 Rs are interconnected ...
changing one often causes
changes in others***

Principles of 4R Nutrient Stewardship

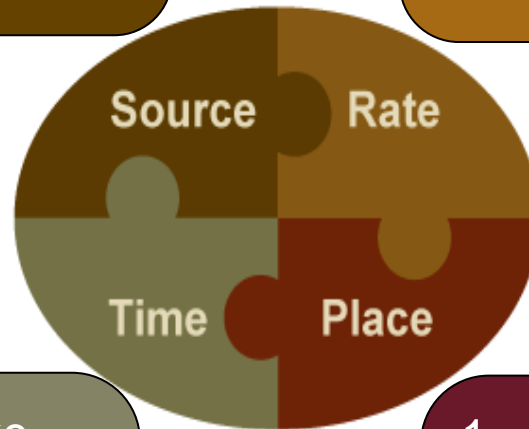
- Stakeholders choose goals
- Producers choose practices (S-R-T-P)
 - Specific to site (crop, soil, weather, system, etc.)
- Science links practices to goals



Universal scientific principles lead to best practices to accomplish management goals

1. Supply in plant available forms
2. Suit soil properties
3. Recognize synergisms among nutrients
4. Blend compatibility

1. Assess plant demand
2. Assess soil nutrient supply
3. Assess all available indigenous nutrient sources
4. Predict fertilizer use efficiency



**All four all
the time**

1. Assess timing of crop uptake
2. Assess dynamics of soil nutrient supply
3. Recognize timing of weather factors
4. Evaluate logistics of operations

1. Recognize root-soil dynamics
2. Manage spatial variability
3. Fit needs of tillage system
4. Limit potential off-field transport

Examples of potential practices for each category

Right Source

1. **Balanced fertilization** that meets crop needs for macro and micronutrients
2. **Appropriate form** – ammonium, nitrate, urea

Right Rate

1. **Yield goal evaluation**
2. Appropriate **soil testing** and plant analysis
3. Consideration of **crop removal**
4. Recognition of **spatial variability** and variable rate application

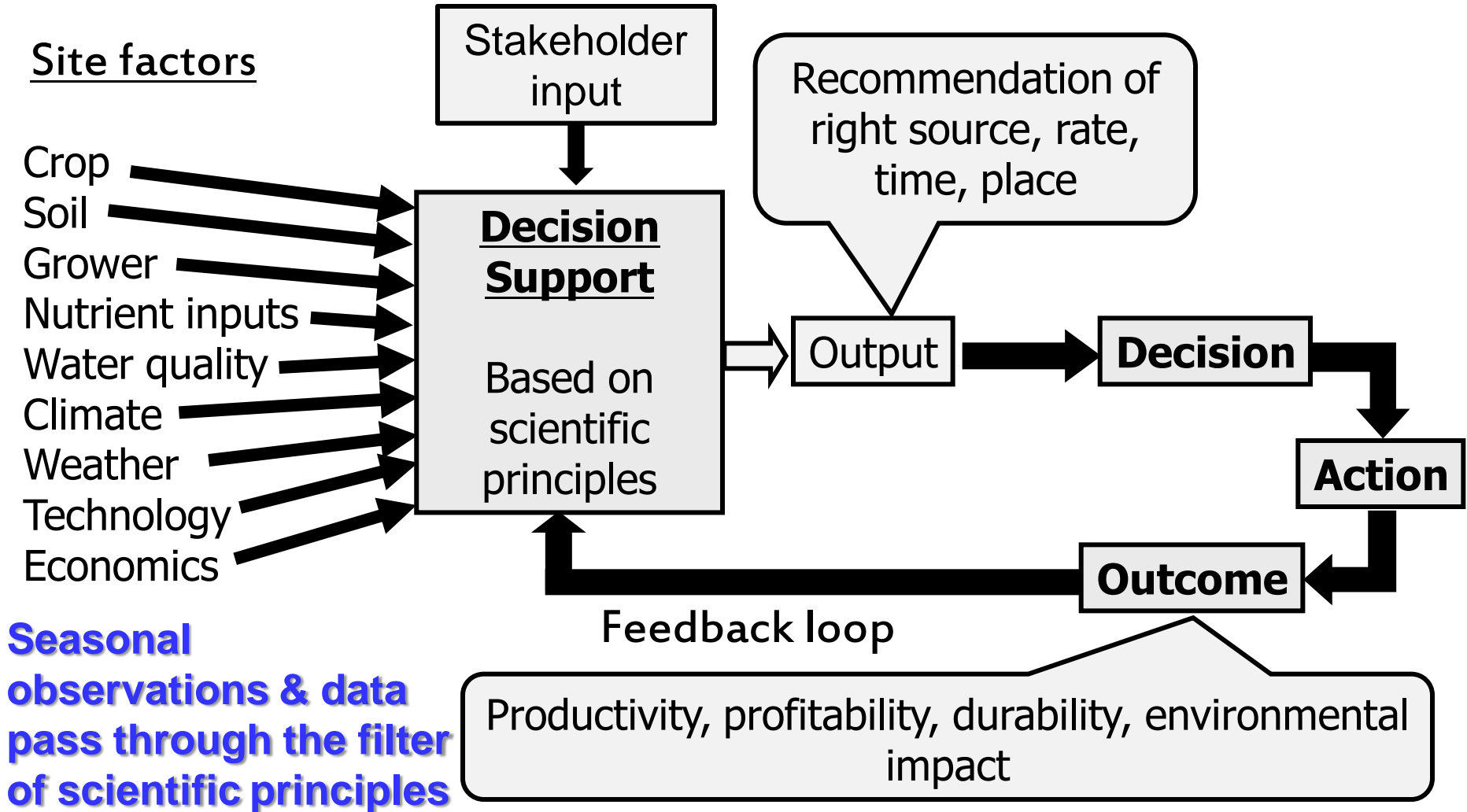
Right Time

1. **Fall N** only on appropriate soils and at appropriate temperatures
2. **Slow and controlled** release fertilizers
3. Urease and nitrification **inhibitors**

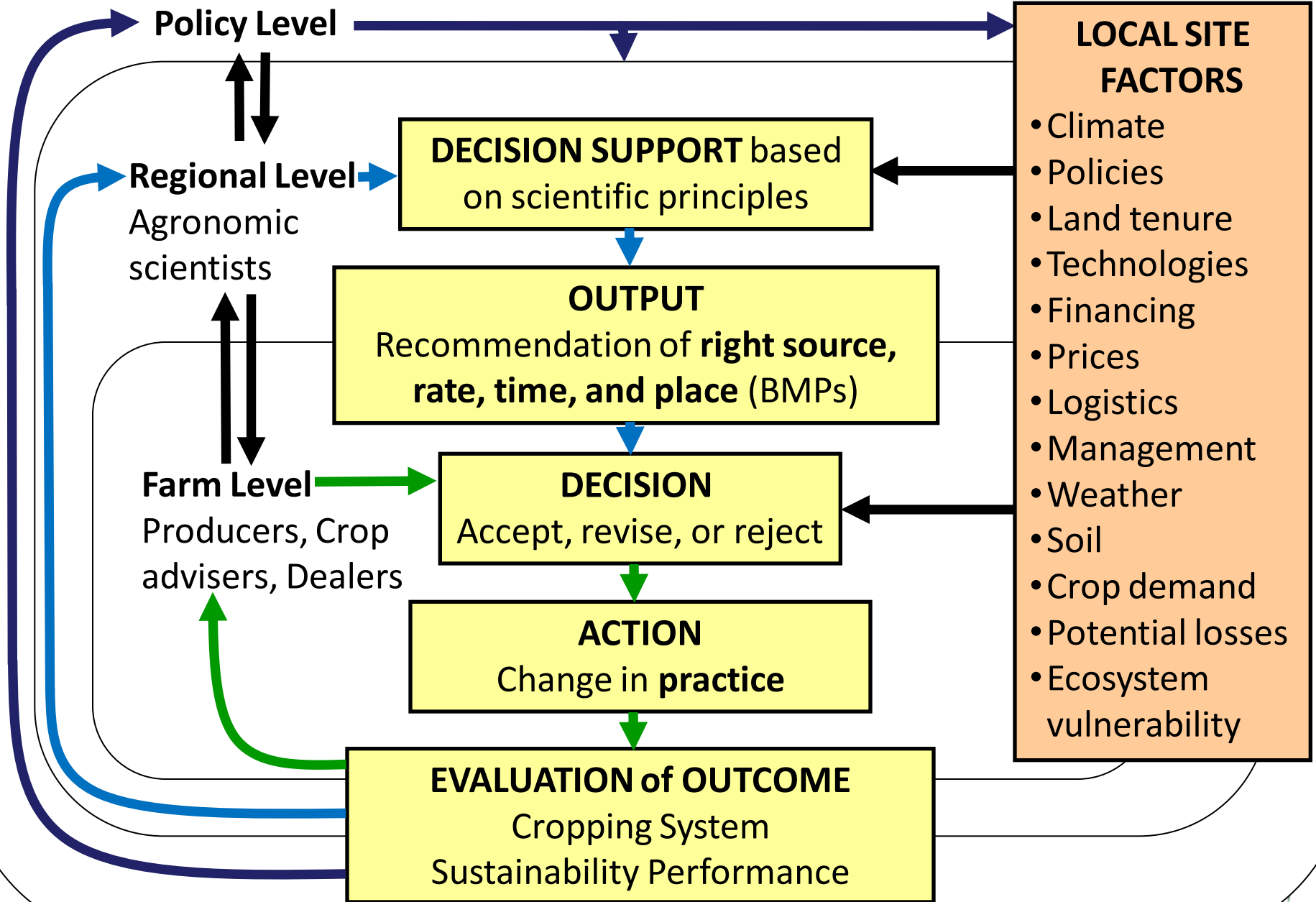
Right Place

1. **Fertilizer bands** appropriately placed for crop roots
2. **Applicator calibration** and maintenance
3. P management modified for **critical source areas** within a watershed (P Index)

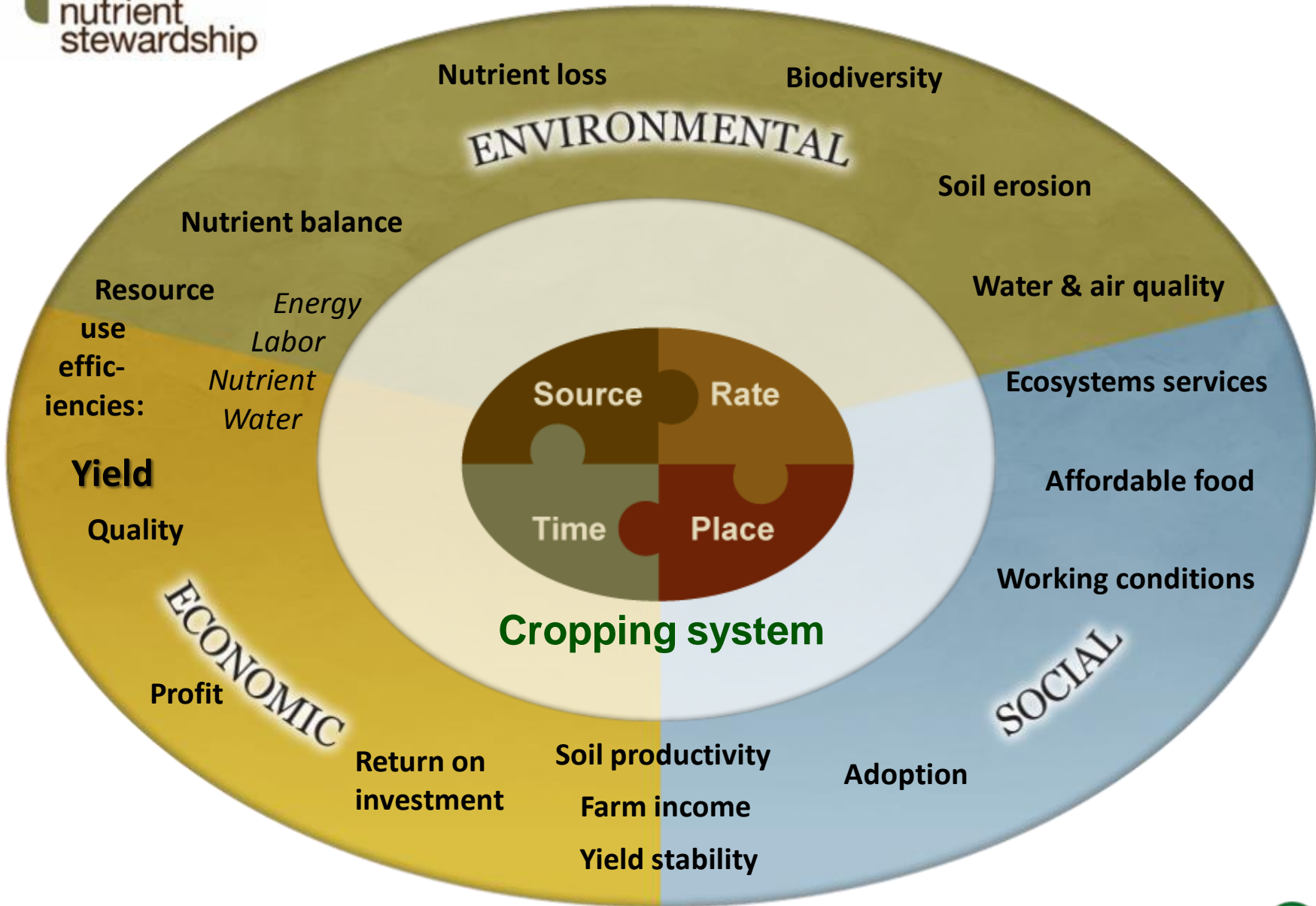
The role of adaptive management in 4R nutrient stewardship – focusing on your “right”



4R Plant Nutrition – Decision Cycle



Performance Indicators



Right Source at Right Rate, Right Time, Right Place



Cerrado



- Diversified cooperative
- 3 southern states; 46 branches
- 17,000 members; 460 employees



EVOLUTION OF THE AREA UNDER NO-TILLING IN RIO GRANDE DO SUL



No-tillage is environmental preservation and social sustainability



Decreases carbon emissions in the atmosphere



besides improving the quality of water



and restoring natural biological activity.

And, rice yields in the region are increasing over 4% per year – the highest rate in the world



Social Responsibility

4R Nutrient Stewardship?





- Putting members' products on supermarket shelves
- Guaranteed origin
- Sustainably grown for world markets



Cooplantio is responding to stakeholder (customer) concerns

For more information on 4R Nutrient Stewardship

<http://www.nutrientstewardship.com/>

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WHAT ARE THE 4RS IMPLEMENT THE 4RS 4R TRAINING

nutrient stewardship

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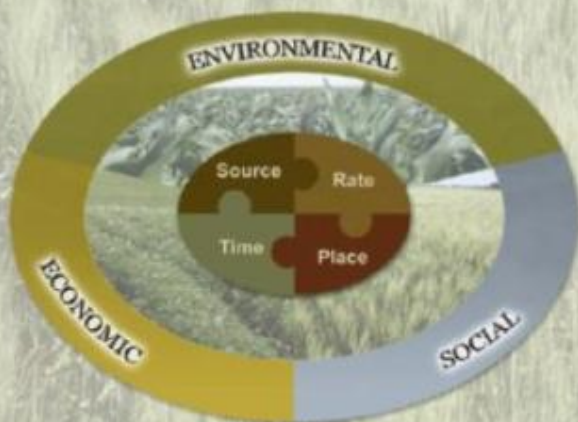
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The 4Rs:
Right Source, Right Rate, Right Time, Right Place

4R PLANT NUTRITION

A Manual for Improving the Management of Plant Nutrition



Foreword

Chapter 1 Goals of Sustainable Agriculture

Chapter 2 The 4R Nutrient Stewardship Concept

Chapter 3 Scientific Principles Supporting — Right Source

Chapter 4 Scientific Principles Supporting — Right Rate

Chapter 5 Scientific Principles Supporting — Right Time

Chapter 6 Scientific Principles Supporting — Right Place

Chapter 7 Adapting Practices to the Whole Farm

Chapter 8 Supporting Practices

Chapter 9 Nutrient Management Planning and Accountability

Symbols and Abbreviations

Glossary

Review Answers



Thank you for attention!

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