



# The International Nitrogen Initiative -*From Noordwijkerhout to Costa do Sauipe: How Have Minds Evolved?*

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International Fertilizer Industry Association (IFA)

Fertilizer Outlook and Technology Conference  
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## Background

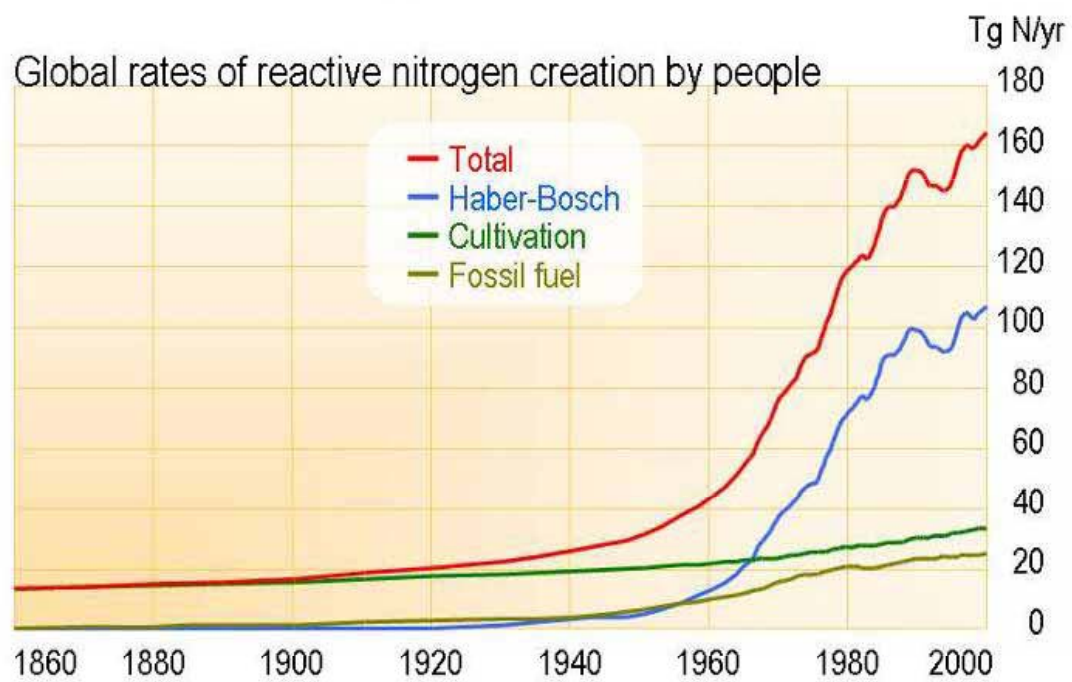


## Reactive Nitrogen: What Is It?

Examples of reactive forms of N (Nr)	
Inorganic reduced forms	Ammonia ( $\text{NH}_3$ ) Ammonium ( $\text{NH}_4^+$ )
Inorganic oxidized forms	Nitrite ( $\text{NO}_2^-$ ) Nitrate ( $\text{NO}_3^-$ ) Nitrous oxide ( $\text{N}_2\text{O}$ ) Nitric oxide ( $\text{NO}$ ) Nitrogen dioxide ( $\text{NO}_2$ )
Organic compounds	Urea Amines Proteins



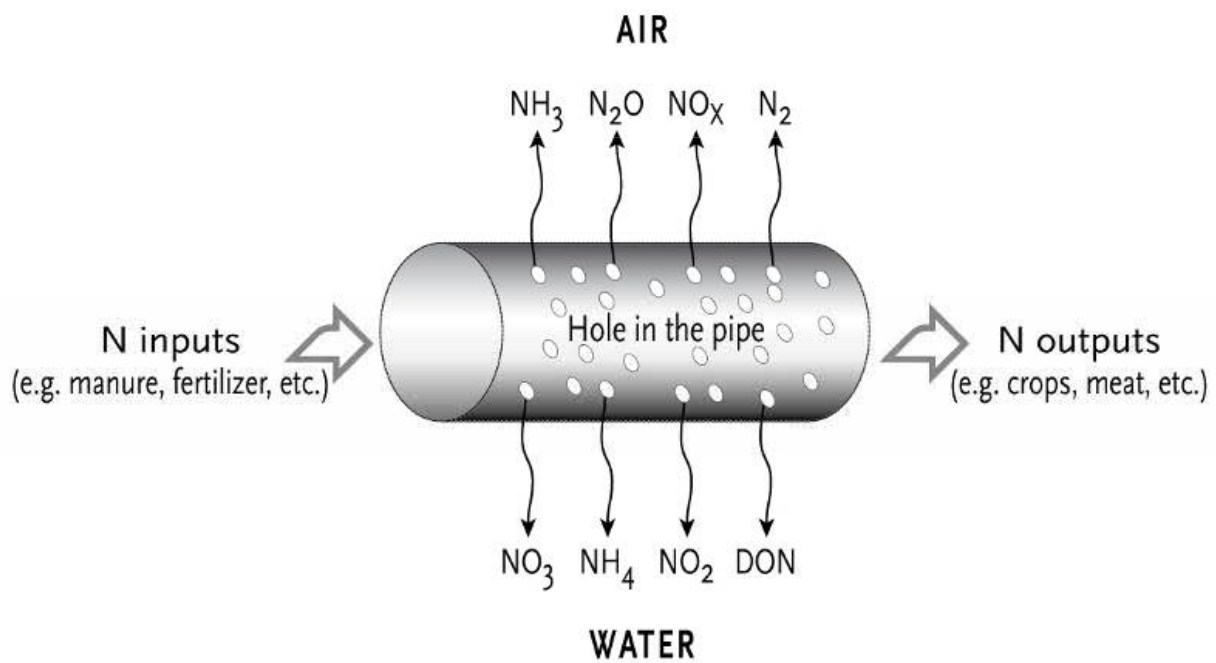
## Reactive Nitrogen: The Issue



Source: Galloway et al



## Reactive Nitrogen: The Issue

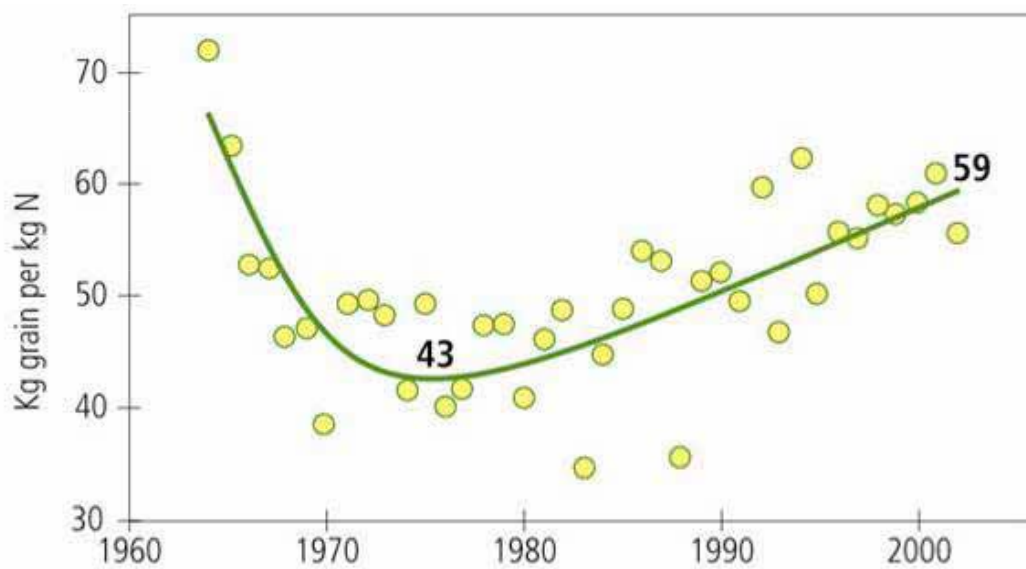


Source: Sutton et al



## Reactive Nitrogen: The Issue

Fertilizer N Use Efficiency ( $PFP_N$ ) Trend for US Corn

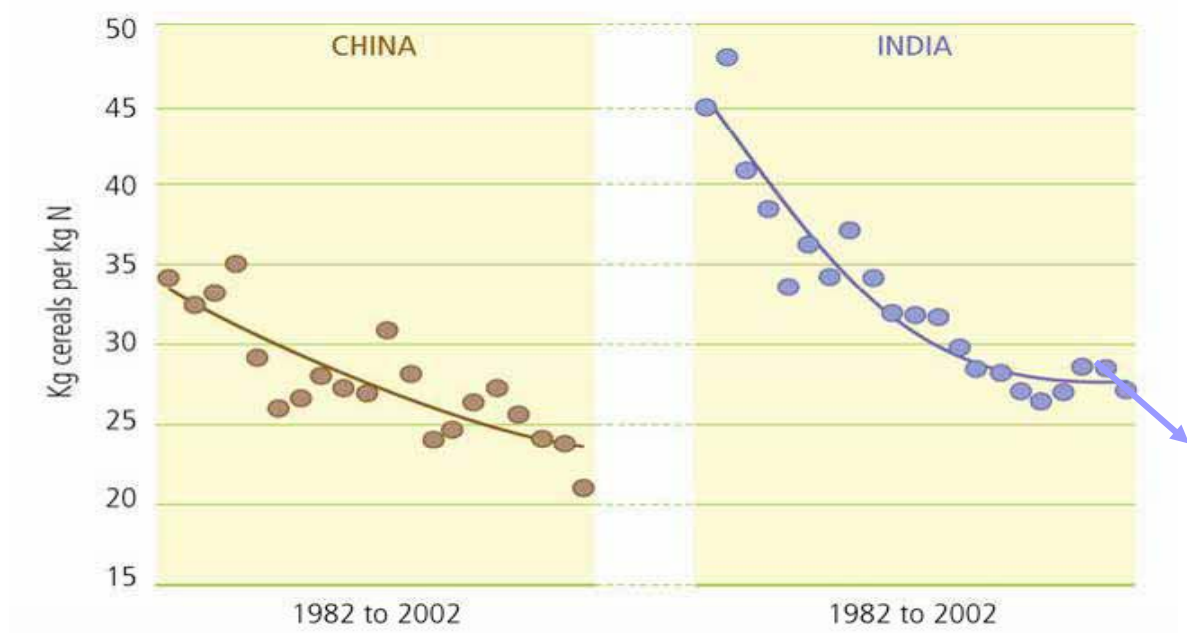


Source:: Fixen and West



## Reactive Nitrogen: The Issue

Fertilizer N Use Efficiency ( $PFP_N$ ) Trend for Cereal Production in Asia



Calculated using FAO and IFA data



# Reactive Nitrogen: The Challenge

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- ➡ Further improve N use efficiency in developed countries
- ➡ Revert the declining N use efficiency ( $PFP_N$ ) trend in developing countries
- ➡ Not to the detriment of crop yields



Credit:: Paul Seward



Credit:: Yin Kedong



Credit:: Mark Sutton





# From the 1<sup>st</sup> to the 4<sup>th</sup> International Nitrogen Conference





## Where Is Noordwijkerhout Located?





## And...Where Is Costa do Sauipe Located?





# From Noordwijkerhout to Costa do Sauipe

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## From Noordwijkerhout to Costa do Sauipe

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## Milestones on Nitrogen Fertilizer

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- ➔ 1998: 1<sup>st</sup> Int'l N Conference, The Netherlands
- ➔ 2001: 2<sup>nd</sup> Int'l N Conference, USA
- ➔ 2002: Establishment of the International N Initiative (INI)
- ➔ 2003: UNEP's Global Environment Outlook Yearbook focuses on nitrogen
- ➔ 2004: SCOPE workshop on fertilizer N, Uganda
- ➔ 2004: 3<sup>rd</sup> Int'l N Conference, China
  - Adoption of the "Nanjing Declaration", which is submitted to UNEP*
- ➔ 2006: UNEP/Woods Hole workshop on policy responses, France
- ➔ 2007: 4<sup>th</sup> Int'l N Conference, Brazil



# The 1<sup>st</sup> International Nitrogen Conference

## *1998, The Netherlands*

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- ➔ Focus on effects of increased cycling of N from local to global scales
- ➔ Key messages:
  - N fluxes in the atmosphere and biosphere increase in all parts of the globe
  - N has a range of well understood beneficial and detrimental consequences for people and the environment
  - Scientists and decision makers need to work together to solve N-related problems
- ➔ Was recommended to organize a second conference in the USA





# The 2<sup>nd</sup> International Nitrogen Conference

## *2001, Maryland, USA*

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- ➔ Focus on North America and Europe
- ➔ Key goals:
  - Increase scientific knowledge about N sources and effects
  - Stimulate communication among leaders in N production and consumption
  - Explore policy strategies to increase food and energy production and decrease environmental impacts
- ➔ Was recommended:
  - To organize a third conference in China
  - To create the International Nitrogen Initiative





# The International Nitrogen Initiative

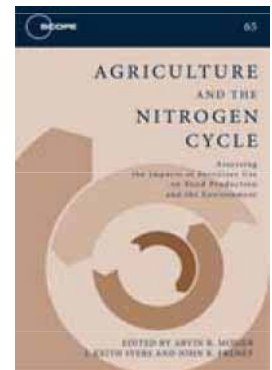
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- ➔ Established in 2002
- ➔ A 3-step approach to move from science to the implementation of the right responses
  - Assessment of knowledge (N fertilizer, denitrification...)
  - Identification of solutions
  - Implementation of solutions
- ➔ Works through regional centers: North America, Latin America, Europe, Asia, Africa
- ➔ IFA and IPNI representatives invited as advisors

**[www.initrogen.org](http://www.initrogen.org)**



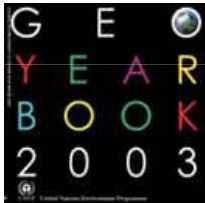
- ➡ Organized by SCOPE and sponsored by IFA
- ➡ Focus on N fertilizer use (too much and too little)
- ➡ Key issues:
  - Crop, environmental and management factors affecting N use efficiency
  - Emerging technologies to increase use efficiency of fertilizer N
  - Pathways of N losses and their impacts on hu the environment
  - Societal responses for balancing food product environmental concerns
- ➡ Proceedings were released for the 3<sup>rd</sup> Int'l N Con





## Context Prior to the 3<sup>rd</sup> International Nitrogen Conference

- ➔ UNEP raises public interest through a chapter on the “N cascade” in its 2003 GEO Yearbook and a press release on “dead zones”



- ➔ High focus on negative impacts of misuse or overuse of N fertilizer
- ➔ Attempts to call for an international binding protocol on reactive N



# The 3<sup>rd</sup> International Nitrogen Conference

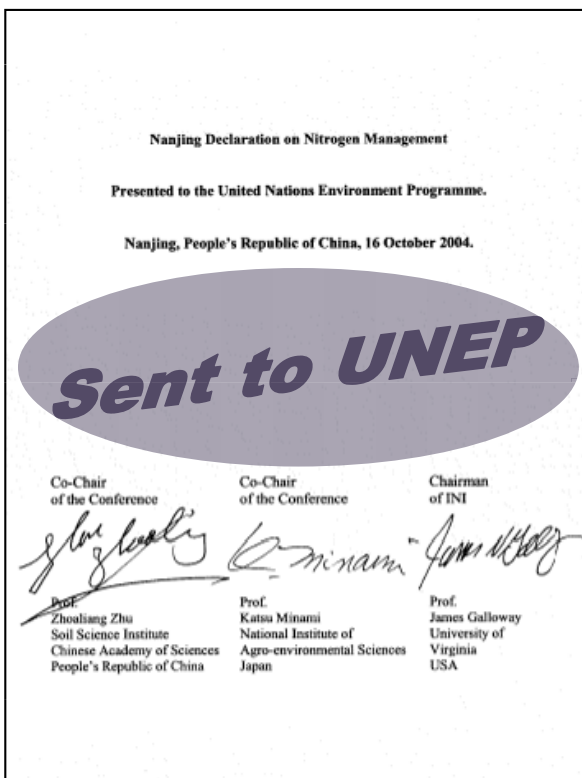
## *2004, China*

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- ➡ Focus on Asia
- ➡ Key goals:
  - Exchange and integrate scientific knowledge on sources, fates and consequences of N at different scales
  - Explore balanced strategies to increase food and energy production while protecting environmental quality and natural resources
  - Suggest an action plan
- ➡ Side-events organized by the industry
- ➡ Was recommended to organize a fourth conference in Brazil
- ➡ The “Nanjing Declaration” on N management was adopted



## The “Nanjing Declaration”



*It calls upon governments to optimize N management at different scales by:*

- ➔ Further assessment of the N cycle
- ➔ Increasing N use efficiency and effectiveness in agricultural production and energy use
- ➔ Developing solutions to reactive N problems (due to both excess and lack)
- ➔ Developing and promoting:
  - A code of good agricultural practices
  - Strategies for sustainable energy use
  - Application of emission reduction technologies



# UNEP/Woods Hole Policy Workshop

## 2006, *France*

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- ➡ Brought together policy makers, scientists and industry
- ➡ Key objectives:
  - Determine specific challenges posed by reactive N
  - Assess effectiveness of existing policy instruments
  - Explore a possible comprehensive approach to managing reactive N
- ➡ Key conclusions:
  - There are no and should not be N policies *per se*
  - Policies should look at specific issues (climate change, eutrophication...) and be tailored to local conditions



# The 4<sup>th</sup> International Nitrogen Conference

## *2007, Brazil*

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- ➔ First conf. entirely organized under the auspices of INI
- ➔ Focus on Latin America
- ➔ First conference looking at both “too little” and “too much” N
- ➔ First conference with full session dedicated to the industry
- ➔ Some of the main issues addressed:
  - Biofuel production and N<sub>2</sub>O emissions
  - Animal production and alterations of the N cycle
  - Indirect impacts on human health of reactive N losses
  - N fertilizer use and poverty alleviation
  - Policy responses (assessment needs, policy instruments)

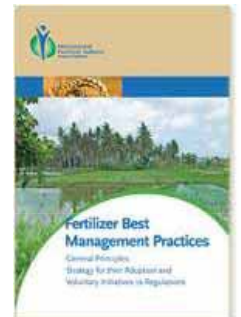
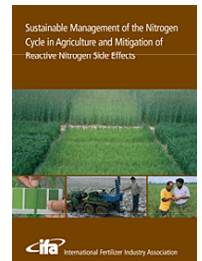




## What Has Happened on the Industry Side?

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- ➔ 2003: IFA established a task force on enhanced-efficiency fertilizers → workshop in Germany in 2005
- ➔ 2004: IFA established a task force on reactive N → booklet in 2006 to raise awareness of the members
- ➔ 2006: IFA established a task force on fertilizer best management practices → workshop in Belgium in 2007
- ➔ 2007: PPI becomes IPNI → a Nitrogen Program is established







## In Summary

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- ➡ Much greater trust among stakeholders
- ➡ Improved communication and better understanding of respective expectations
- ➡ Stronger involvement of all stakeholders in trying to achieve common goals
- ➡ But... disagreements on some sensitive issues still remain



What Next?



## Challenges for INI

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- ➔ New chairman to be appointed soon
- ➔ Remain scientifically sound and independent from policy pressures
- ➔ Find funds for organizing additional workshops (e.g. on N and human health)
- ➔ Budget constraints for the Latin American, Asian and African centers
- ➔ Keep right balance between regions with “too much” and those with “too little” reactive N
- ➔ Strengthen partnerships between key stakeholders

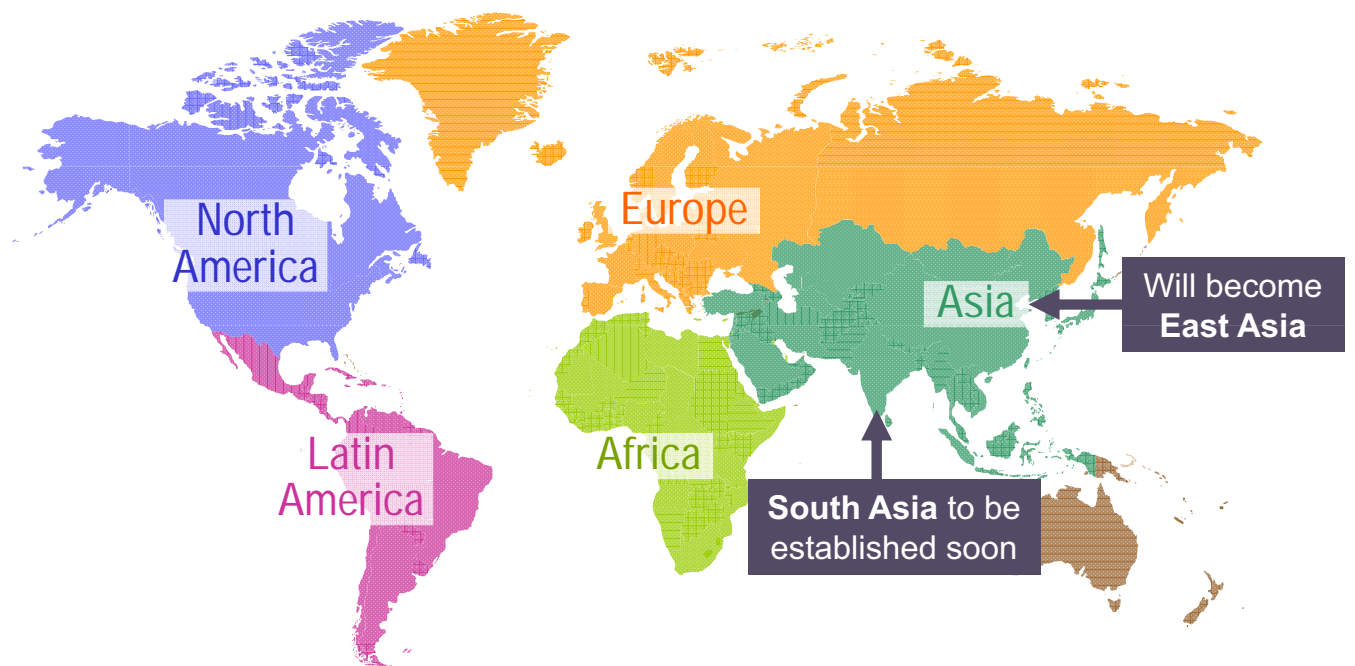


James Galloway  
University of Virginia, USA  
Chairman of INI



## The INI Regional Centers

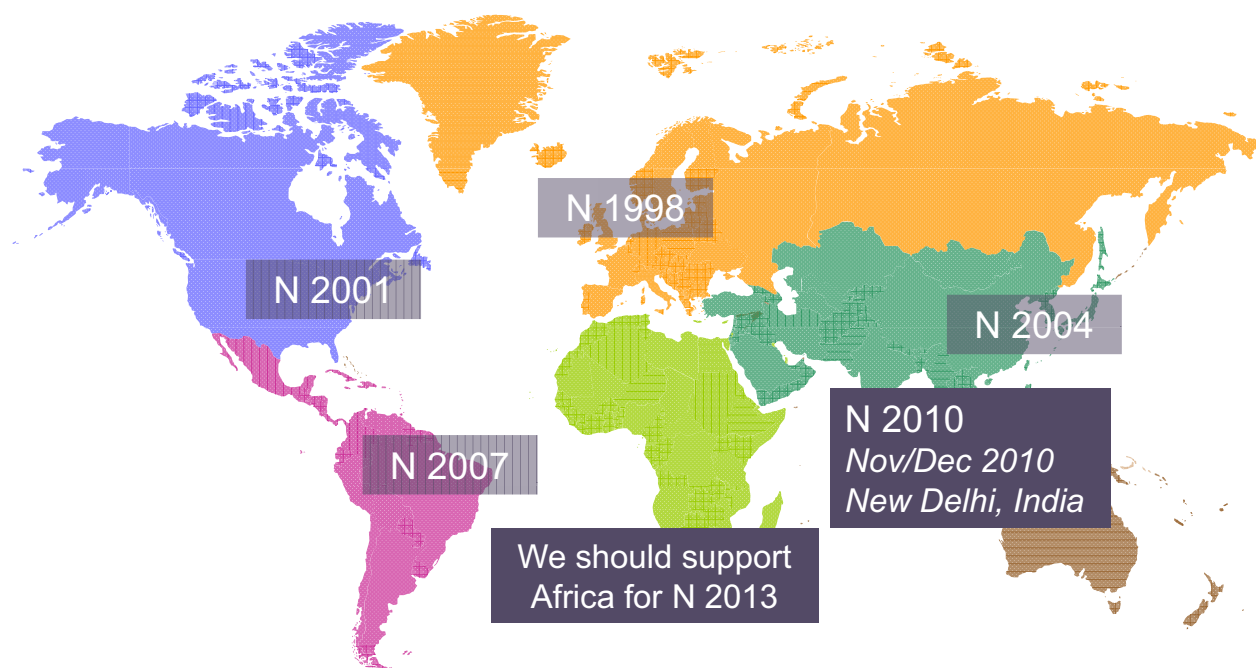
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# The 5<sup>th</sup> International Nitrogen Conference

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## Challenges for the Industry

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- ➔ Remain actively involved in INI through IFA and IPNI
- ➔ Closely monitor scientific and policy issues relating to fertilizer N
- ➔ Develop links with other suppliers of N sources to agriculture (animal manure, biofuel co-products, sewage sludge)
- ➔ Increase links at the regional level, in particular in Asia, Latin America and Africa
- ➔ Help manage unwanted impacts associated with the use of fertilizer N (and possibly other N sources in agriculture)
- ➔ Advocate in favour of greater fertilizer N use in Africa
- ➔ Better communicate on industry's initiatives and achievements, in particular on fertilizer BMPs



*Thank you!*

[www.fertilizer.org](http://www.fertilizer.org)

