

# Analytical approaches to identify sources of sand and dust storms and their combat

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# Outline

- Why a Comprehensive Approach important
- Dust Storm Cycle and Conceptual Approach
- Requirements to solve Dust Storms
- Analytical Approach to Identify Sources and Design a Programme (the case of Iraq)
- How to deal with sources (hotspots)
- Effectiveness of dust storms mitigation measures (site specific monitoring)

# What Iraq is Doing for SDS?

المشروعات في طور التنفيذ

المشاريع	الفترة الزمنية	المساحة التي يغطيها المشروع	أهم أنشطة المشروع	موقع تنفيذ المشروع	الجهة المنفذة	الجهة الممولة
مشروع تثبيت الكثبان الرملية	من اوائل السبعينيات ( 1971 ) ولحد الان	اكثر من مليون هكتار ( 4 مليون دونم ) من الاراضي في المنطقتين الوسطى والجنوبية	تثبيت الكثبان الرملية وذلك من خلال الطريقة الميكانيكية ( التغطية الطينية ) والطريقة البيولوجية ( زراعة الاشجار والشجيرات المتحملة للجفاف والملوحة /شوك الشام والاثل بالتزامن مع نمو النباتات الطبيعية )	محافظة ذي قار ومحافظة صلاح الدين/ قضاء بيجي	الهيئة العامة لمكافحة التصحر / وزارة الزراعة	حكومة العراق
مشروع واحات المنطقة الغربية	من اوائل السبعينيات ( 1971 ) ولحد الان	50 واحة بمساحة من 25 إلى 200 هكتار	زراعة الأشجار المختلفة بالاعتماد على سقيها بمياه الابار بأستخدام منظومات الري بالتنقيط	المنطقة الغربية من العراق / محافظة الانبار	الهيئة العامة لمكافحة التصحر / وزارة الزراعة	حكومة العراق
مشروع تنمية الغطاء النباتي الطبيعي	من اوائل السبعينيات ( 1971 ) ولحد الان	مفتوحة	تنمية النبت الطبيعي	المنطقة الغربية والجنوبية للعراق	الهيئة العامة لمكافحة التصحر / وزارة الزراعة	حكومة العراق
أنشاء مزارع نموذجية إرشادية للنباتات المتحملة للجفاف ومحاصيل العلف	2008	مساحات صغيرة محددة	أنشاء مزارع نموذجية إرشادية للنباتات المتحملة للجفاف ومحاصيل العلف لغرض التعريف بها ونشرها	-	الهيئة العامة لمكافحة التصحر / وزارة الزراعة	حكومة العراق

# Common language necessary!



*Important to be clear since each need different mitigation interventions although they contribute to each other's solutions especially if local source is at the same time regional source (e.g dust = fine particles less than 6 microns)*

**Dust storms cannot be stopped by natural or artificial barriers because it leaves a column of suspended dust reaching 1 km height, so it has to be *managed* at the source and *coped with* at the recipient end**

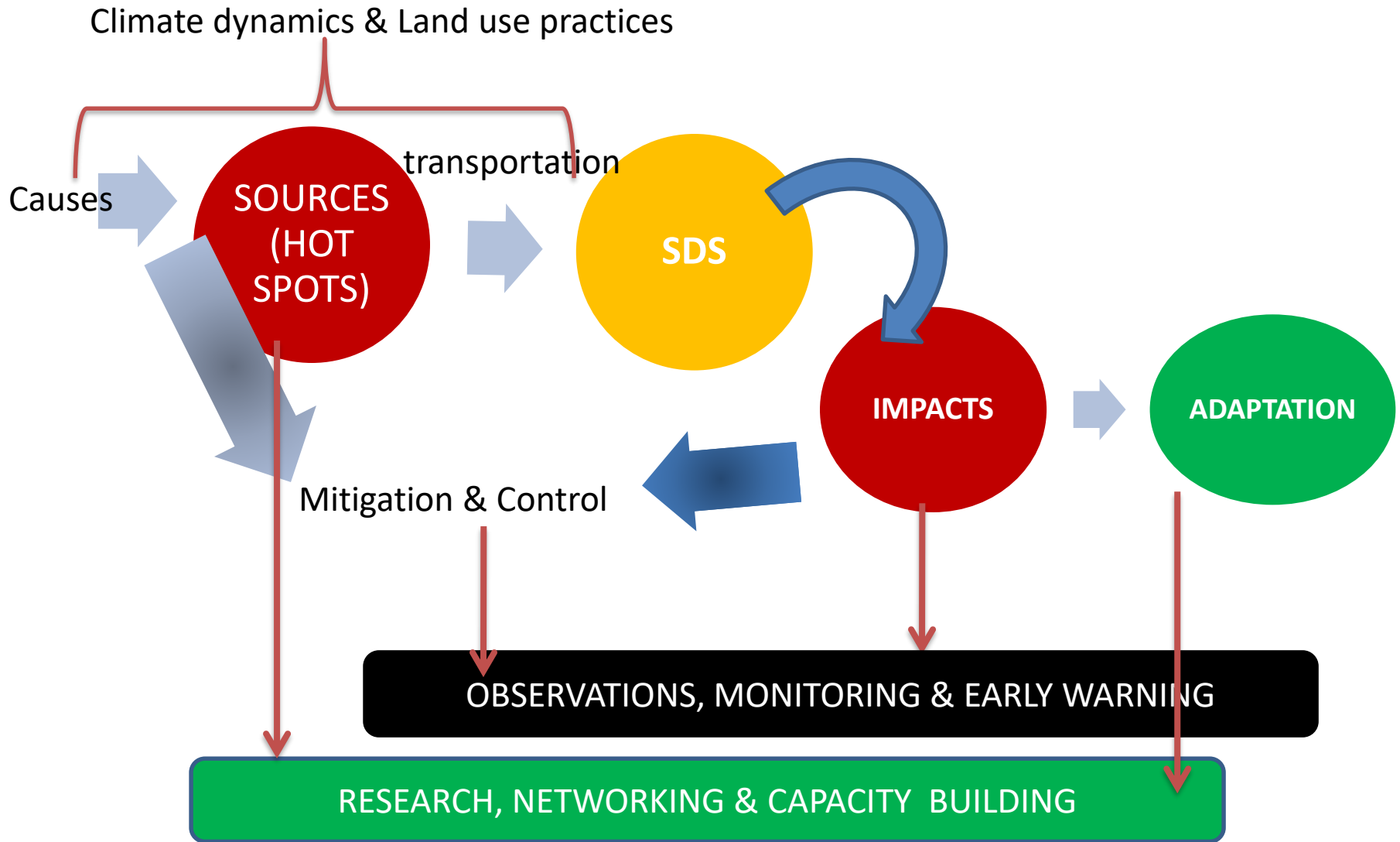
**Hot spots (source areas) are point source (small exporting area) within a cluster (large area)**

**Primary sources (originating area) and secondary sources (dust coming from the primary source blown through this secondary source area)**

# Why Comprehensive Approach Important

- Solving the problem from root causes
- Transboundary nature of dust storms (Arab region is both source and recipient)
- Response should take into consideration all dimensions (climate, land & water management, landscape approach, etc)

# Comprehensive Approach

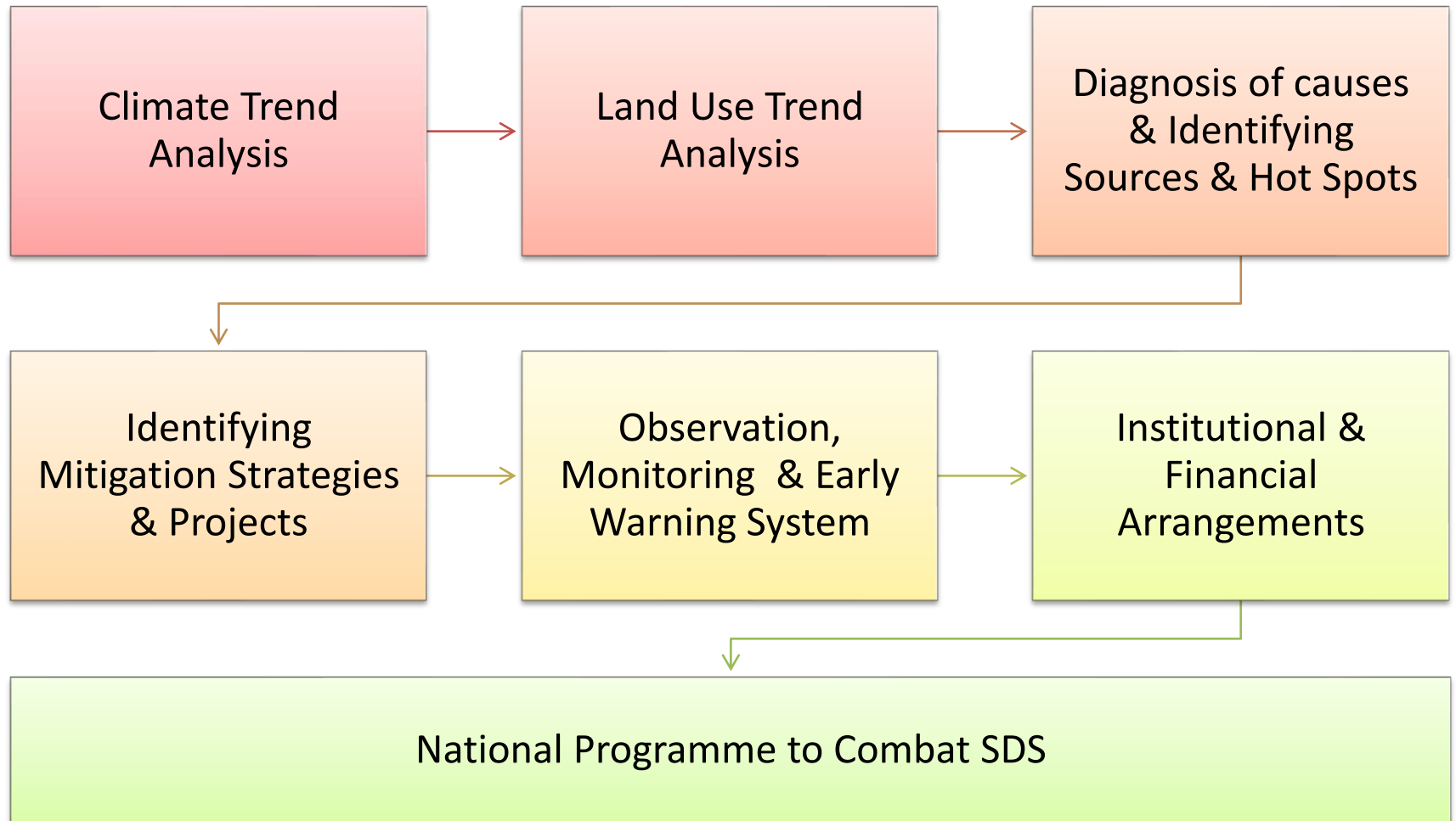


# Knowledge Gaps

*Any programme to combat SDS should be comprehensive as to address the full cycle of sand and dust storms:*

Issues	Requires knowledge of
Causes and sources	Knowledge on land use, drought, desertification
transportation & climate dynamics	Historical trends, prediction climate models, region-wide assessment
Monitoring, early warning & preparedness	Network of monitoring stations, early warning system, communication, public alert and advisory tools
Impacts Assessments	Impacts on health, productivity and economy as a whole
Prevention and Effective Mitigation	Land & ecosystem rehabilitation, appropriate and nation-wide design programme of soil fixation, plantations, wind barriers, etc
Management	Strong Science-Policy Link, Institutional Collaboration at the governorate, country and regional levels

# Analytical Approach to identify priorities for a country Programme – Iraq Example





# Output 1.2: Assessment of dust and sand storms transportation pathways and dynamics within Iraq

Baseline & literature review

Historical Trends Modeling &  
Future Prediction:

Based on visibility records,  
satellite images, observation data

Use meso-scale climate modeling

In collaboration with Barcelona  
Super computing Centre

Observation, Monitoring & Early  
Warning System

AREONET Stations

National Network

Institutional Arrangements

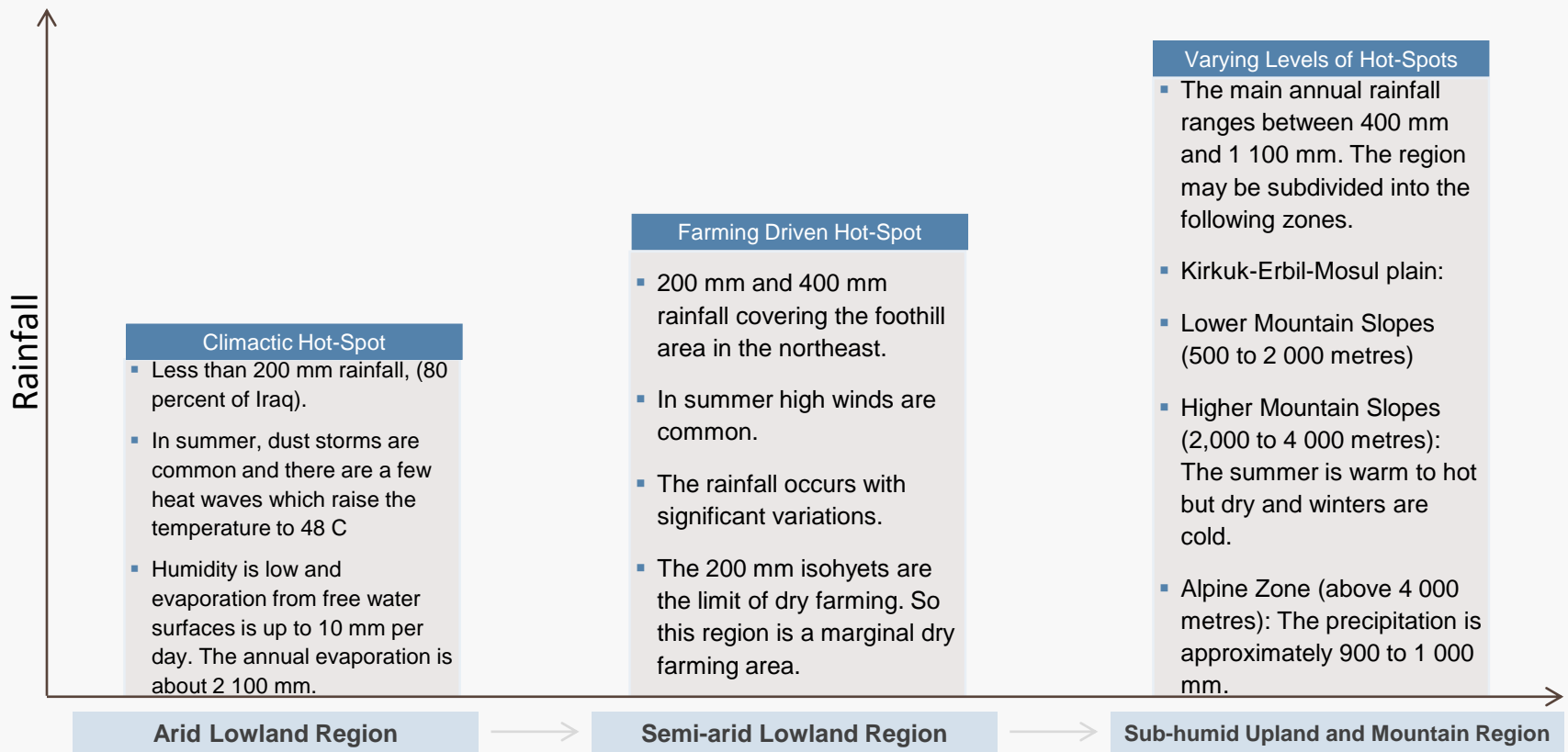
Implementation Plan

## Output 1.2: Assessment of dust and sand storms transportation pathways and dynamics within Iraq

1. Where dust come from? What is the source: classified (passive, active, primary, secondary, )
2. What is dust storms: rising & suspended
3. Mapping sources and paths
4. Occurrence and severity of dust storms
5. Causes of dust storms

# Understanding the Context

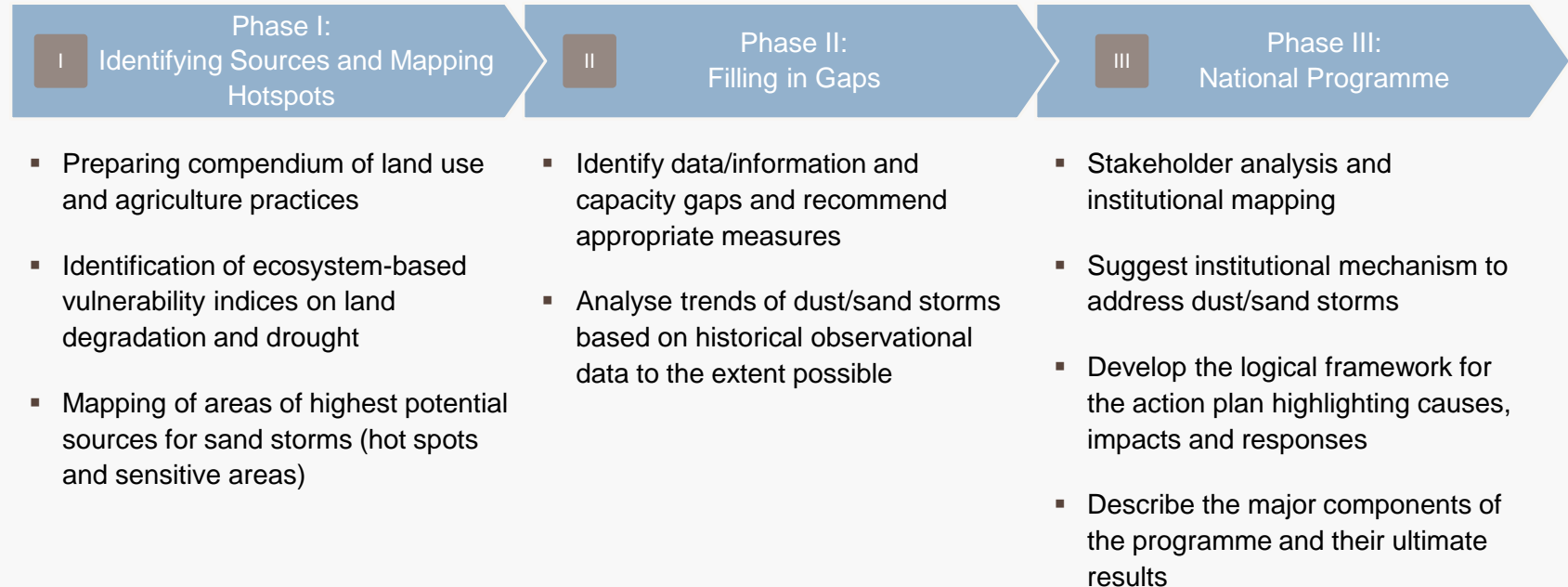
Understanding the relationships between Climactic Regions and their correlation to Sand and Dust Storm Hotspots based on Land Management Practices



## Summary of FAO's Component

FAO will focus in the assessment and analysis of causes including on-farm water and land-use management practices which is expected to guide us towards appropriate mitigation and improvement measures.

### Approach



## Change Drivers

Changes in on-farm practices and technology will play a critical role in ensuring the mitigation of the effects of Sand and Dust Storms

### Enablers of SDS

Enablers are current practices and land uses that contribute a conducive environment for the harmful effects of Sand and Dust Storms.

1

Loss of Vegetative Cover

2

Rangeland Abuse: Overgrazing,  
Conversion to Crop Land

3

Shifting Sand Dunes

4

Water Logging

5

Declining Soil Characteristics:  
Salinity, Erodibility, Wetness

### Disruptors of SDS

Disruptors are technologies and practices that can create sustainable positive disruption in the effects of Sand and Dust Storms and their role in Agriculture.

1

Protecting Grasslands and Oases

2

Conservation Tillage Operations

3

Windbreakers on Farm Peripherals

4

Sustainable Crop Management

5

Improving Soil Quality

# Root Causes, Drivers, Climate & Land dynamics Not Yet Well Defined at the Source Areas, *We need local studies (example below)*

IRAQ					IRAN	
Al Jazeera	Hammad Basin (transboundary with Syria, Jordan, Saudi Arabia)	Alluvial Plain (Dalmaj to Rumaithah)	Eastern Sand Belt (transboundary with Iran)	Heet (salah e-Idin province)	South West Cluster (Khuzestan and Ilam provinces)	South East Cluster (Sistan, Blushitan & Karman provinces)
Gypsum, Wadis, Rangeland pastoralists	Rangeland	24% of lad area of Iraq  Fertile agriculture land	Wind soil erosion Salty	??/	Soil & Alkaline	Water & watershed management issues
Mining	Land degradation		Degraded vegetation cover		Land degradation, land use, land abandonment	Agriculture Over grazing Watershed management
Tillage practices	Land & water management issues	???	???	???	Salty soil	
Land abandonment	???			??		

# Diagnosis of causes & Identifying Sources & Hot Spots

## Analytical Approach:

1. Problem-tree analysis? One for sand and other for dust.

2. Projects are the level of interventions

### 2. Criteria for identifying hot spots/Projects:

1. Size of the area should not be less than xxx (land scape level or )

2. the area should be a regional source for dusts?

3. The site can be a new site or have synergy with ongoing work undertaking by the government and local communities

4. Local stakeholders involvement including the private sector

5. Local experiences and achievements in both technical and policy aspects of land management will be especially valuable in selection and design of the Hotspot projects.

6. Sites should be representative of different natural conditions and ecosystems

7. Sites should benefit from integrated and ecosystem-based approaches to drought, desertification, water resources management, climate change adaptation, biodiversity conservation and socio-economic development

8. State of land degradation should be substantial in extent and quantifiable by appropriate indicators that enable scientists to determine the original vegetation level.

9. Appropriate monitoring is possible to evaluate the effectiveness of SDS measures

10. Project interventions have/will have positive impacts on local community resilience

# Identifying Mitigation Strategies & Projects

Topics/Issues to be considered:

- List of Projects/Interventions?
- Scalable & Replicable Projects (on-farm, landscape scale, agro-ecological zones)
- Ecosystem-Based Approaches!
- Strategy to involve local communities and governments
- Matrix of Hot Spots
- Project Design Template: how far we go into details





# Identifying Mitigation Strategies & Projects

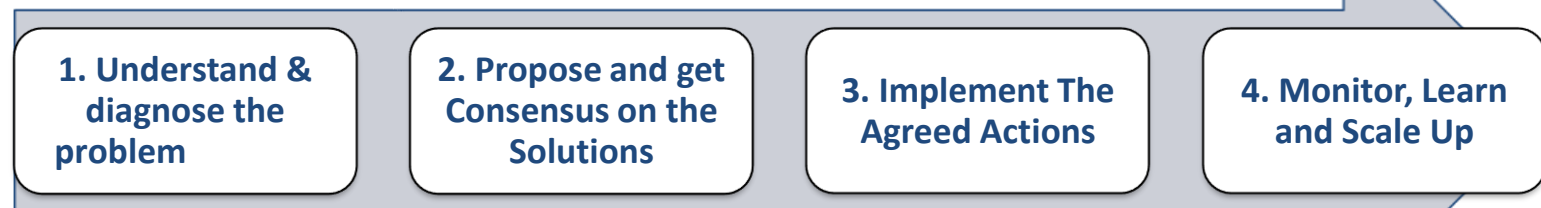
Name and Location of the Hot Spot	Existing, Planned or New Project/Site	Type of Hotspot (sand movement, dust source, or affected area)	Problem Statement (e.g. land degradation, water management, lake, soil erosion, mal agricultural practices, climate-related, etc)	Additional details (e.g. ecological, social significance, likely contribution to impacts, etc)	Type and summary of the Intervention (prevention, mitigation, adaptation, controlling, preventing, etc)	Approaches employed in the project	Inputs needed from the regional programme and additional any additional information and comments

# Regional Approach – Process & Objectives

## – example of the Regional SDS Programme

- ✓ To strengthen cooperation among countries of the region (and within countries)
- ✓ To enhance scientific and societal knowledge about the causes, sources, impacts, dynamics of and coping with the SDS
- ✓ To reduce sources and impacts of SDS through the design and support to the implementation of innovative and scalable solutions
- ✓ To establish systems of coordinated and state-of-the art monitoring and early warning

### Step-Wise Approach

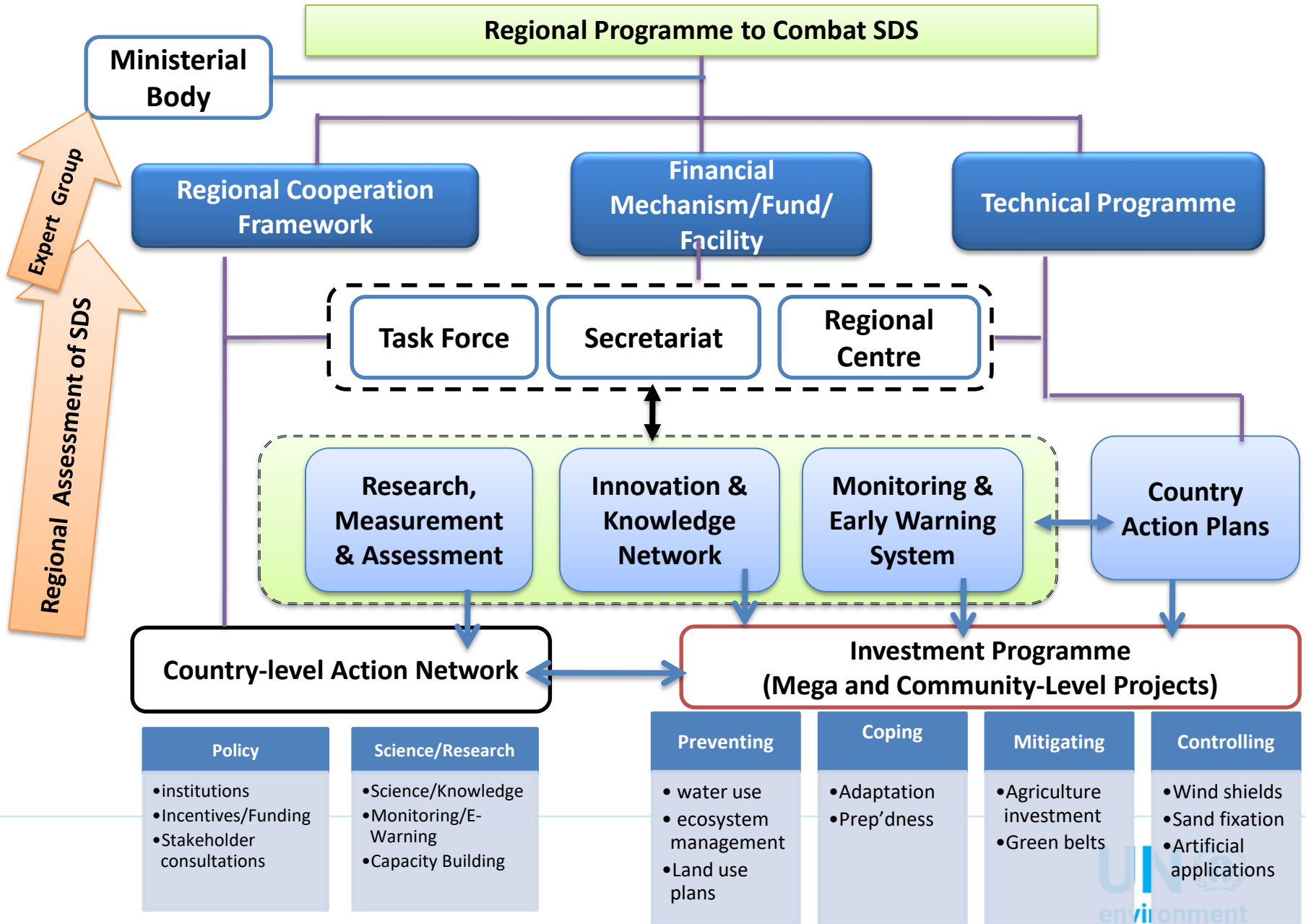


## Example of Incomplete Approach

Country	Turkey	Iran	Iraq	Kuwait	Saudi Arabia	UAE	Oman	Qatar	Syria	Jordan
Dust Monitoring (in-situ)	?	??	??	👍	??				👍	👍
Dust Monitoring (satellite)	👍	👍								
Air Quality Monitoring	👍	👍		👍		👍	👍	👍		👍
Forecasting & Modeling	👍	👍		👍	👍	👍	👍			
Dust mineralogy & geological studies		👍	👍	👍			👍		??	??
Control of Soil Erosion & Dune Movements	👍		👍	👍	👍					
Sand fixation		👍	👍	👍						
Land Management	👍	👍	👍	👍	👍				👍	👍
Water Management										
Greening & Green belts	👍	👍		👍	👍	👍				
Community & Livelihoods Approaches		👍	👍						👍	👍

# OVERVIEW OF REGIONAL PROGRAMME TO COMBAT SAND AND DUST STORMS

*(strategic partnership for transformational and scaled-up actions to realize impacts)*



## Conclusions & Recommendations

- Differentiate between Sand and Dust Storms because each has its own ways of mitigation
- Focus of interventions has been on monitoring & early warning, limited on copying strategies and “prevention”
- Regional and inter-regional collaboration is needed to address the problem
- We need a system in place to evaluate effectiveness of measures to reduce SDS
- Simulation models can help in selecting appropriate mitigation actions

# شكرا لحسن استماعكم

