

Climate Change and Emerging Opportunities in Agriculture

by

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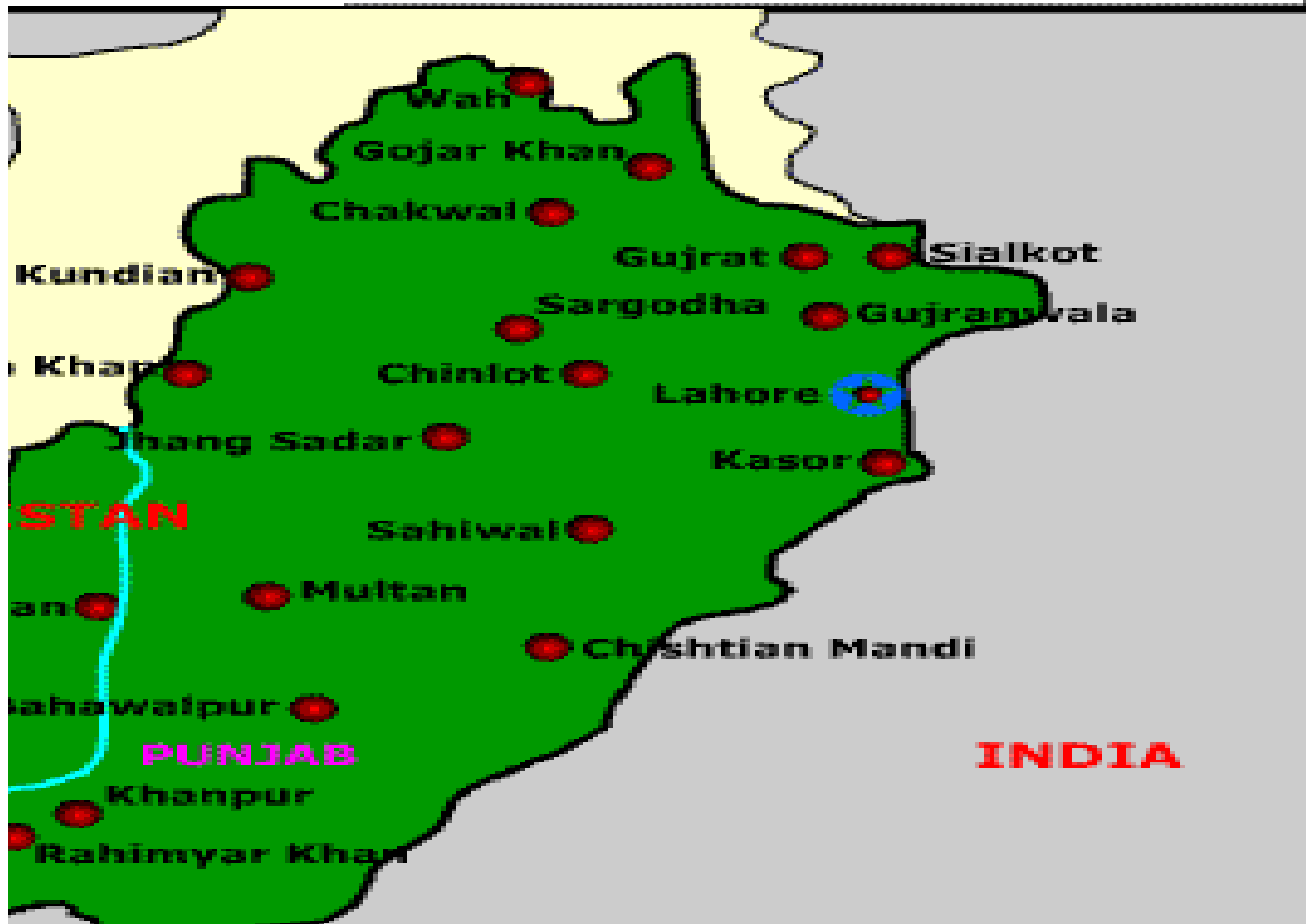
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Purpose

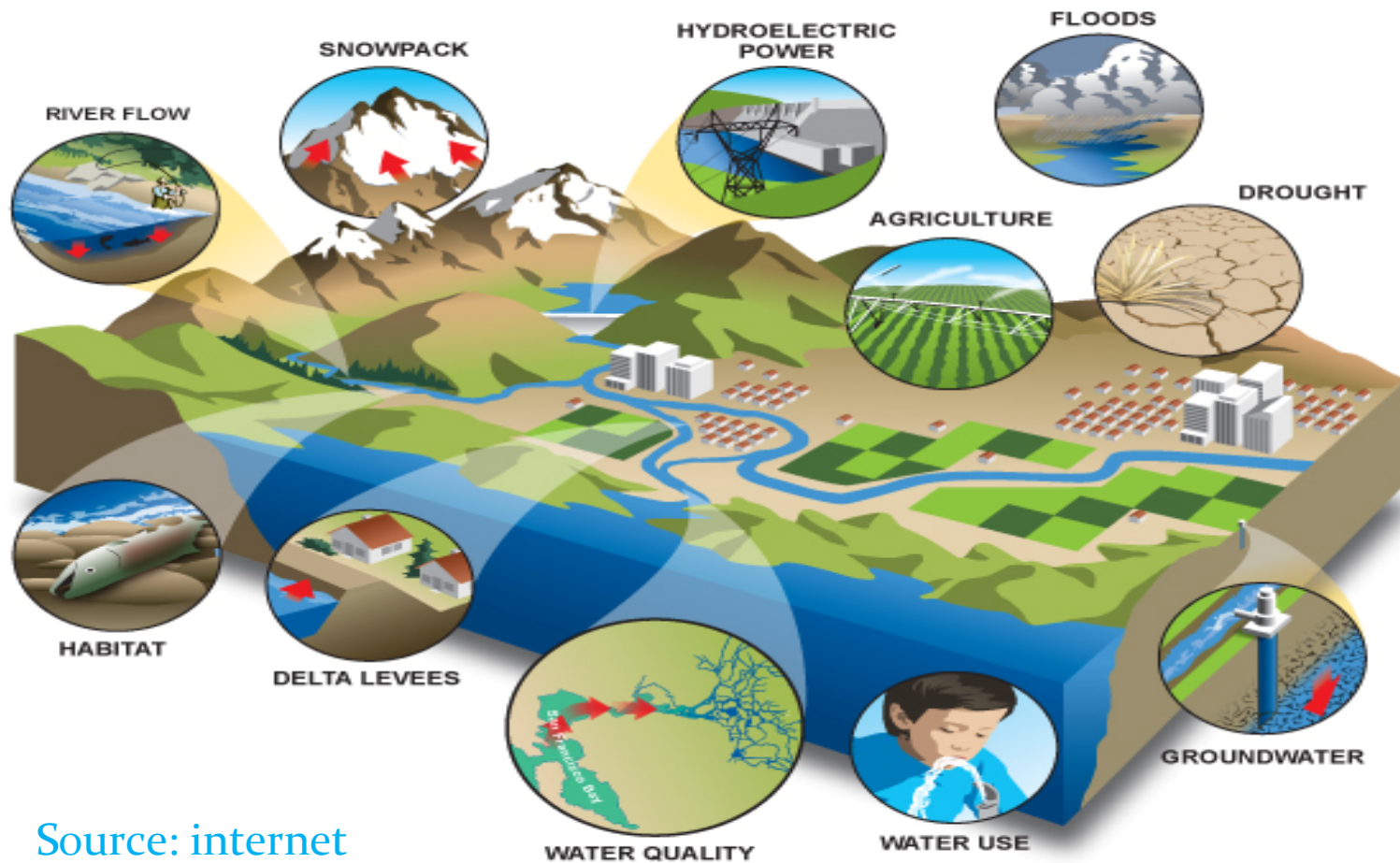
- Recognized many impacts of global warming led climate change are negative
- Highlight some of the potential opportunities that could arise from climate change.
- Identify the gainers and losers and outline an action agenda

Pakistan in perspective





The Core Water Problems explained



Source: internet

Food Security



- Produces 22-24 Million tones of wheat. Now declining and dangerous disease and weed situation
- Major shift in surplus vs. deficit districts. Out of 120 district settings in Pakistan, 74 (62%) were found to be food deficit in terms of net availability. This deficit varies ranging from low through high to extreme degree. Wheat, a staple, catering for 48% of caloric needs in Pakistan, was found deficit in terms of net availability and the shortage was estimated at 3.2 million tons annually. Out of 120 districts, only 48 (40%) were producing surplus or enough to cater to the needs of these districts. In other words, 72 districts (60%) were deficient in wheat availability (Source: Food Insecurity in Rural Pakistan 2003)
- Price of all commodities risen between 12-40% just in past six months (2007/8) and rising unabatedly.
- International price of wheat and rice doubled. Farm community unable to produce at existing prices (wheat, rice, oils), costs (DAP, urea, water, seed) and technology gap.

Availability of food and health care services

VULNERABILITY OF CROPS TO HEAT STRESS

Crops	Temperature Required °C		Climatic Constraints or Requirements	Prevailing Range °C	Vulnerability Level		
	Optimal	Range			1990	2020	2050
Wheat	15-20	10-25	Requires cold period for flowering in early growth. Dry for ripening.	0-40	H	H	H
Rice	22-30	18-35	Small difference in day/night temperature	12-45	M	H	H
Maize	24-30	15-35	Cool temperature causes problem for ripening.	8-44	M	M	H
Cotton	20-30	16-35	18-38°C for ball development. Dry period for ripening.	16-49	H	H	H
Sugar-cane	22-30	15-35	Sensitive to frost during ripening. Cool dry and sunny weather preferred	1-48	H	H	H
Mango	23-30	13-35	Sensitive to frost, strong wind, night humidity.	5-49	H	H	H
Citrus	23-30	13-35	Sensitive to frost, strong wind and high humidity.	0-45	M	H	H

*H - high, when prevailing maximum temperature is more than 10 °C higher than optimal range;
M - medium, when prevailing maximum temperature is 5-10 °C higher than optimal range;
L - low, when prevailing maximum temperature is < 5 °C higher than the optimal range.*

Productivity Per Unit of Water

- **Canada** 8.72 kg/m³
- **USA** 1.56 kg/ m³
- **China** 0.82 kg/ m³
- **India** 0.39 kg/ m³
- **Pakistan** 0.13 kg/ m³

Productivity Per Unit of Land

• France	7.60 T/ha
• Egypt	5.99 T/ha
• Saudi Arabia	5.36 T/ha
• Punjab (India)	4.80 T/ha
• Punjab (Pak)	2.30 T/ha
• Pakistan (Average)	2.24 T/ha

Rain Harvesting



Low Cost Plastic Tunnel



Green House for Nursery and vegetables



STATUS OF GROUND WATER QUALITY (LAHORE DIVISION 2004-08)

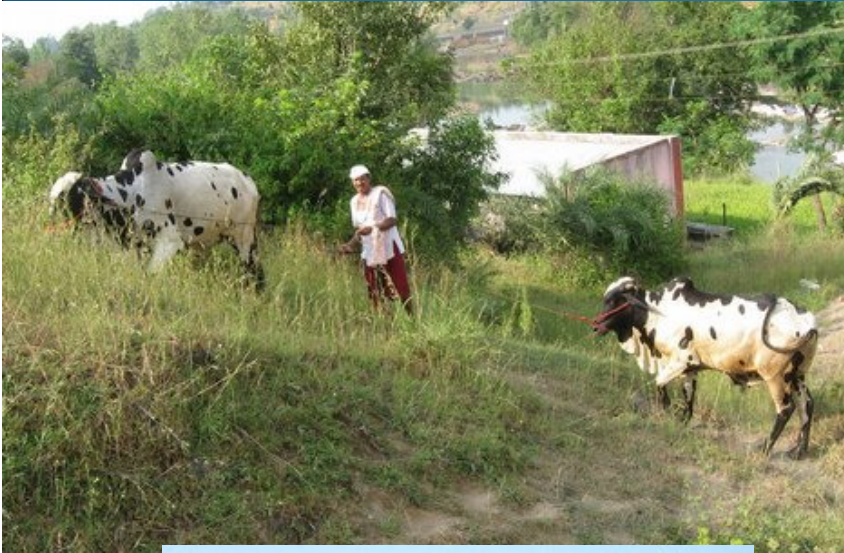
Sr. No	District	No. of water samples /depth											
		Shallow				Deep				Total			
		Total	Fit	Unfit	Unfit % age	Total	Fit	Unfit	Unfit % age	Total	Fit	Unfit	Unfit %age
1.	Lahore	750	410	340	45	2124	623	1501	71	2874	1033	1841	64
2.	Kasur	889	219	670	75	4566	1435	3131	69	5455	1654	3801	69
3.	Sheikhupura	2343	581	1762	75	5798	1233	4565	78	8141	1814	6327	77
4.	Nankana Sb.	1668	475	1193	71	4244	1031	3213	75	5912	1506	4406	74
5.	Okara	825	387	438	53	2387	831	1556	65	3212	1218	1994	62
	Total	6475	2072	4403	68	19119	5153	13966	73	25594	7225	18369	71







Feeding under climate change and high fuel and input costs



Agriculture at Cross roads



Opportunities

- Shifting away from high delta Rice, cotton, sugarcane
- Forced Diversification- 5 grain atta
- High tech conservation agriculture
- Mixed Cropping
- Marginalization– consolidation, economic units
- Internationalization of ag, product differentiation
- Carbon good for agriculture crops
- Pay backs from international polluters
- Yield increases in northern districts
- New duality in crop breeding
- Spreading flood water

Continued

- Processing industry and agri business to rapidly expand i.e supermarkets
- Dynamics in fruits, vegetables and floriculture plus organic foods
- Drylands a hidden secret
- Demand for Punjab's fuel wood to increase rapidly-farm forestry
- Saline areas open up new opportunities i.e. grasslands livestock, dual rice crops, fisheries
- Protected and controlled (tunnel) agriculture to increase rapidly
- A new breed of banks and investors to emerge to cash in on this opportunity
- Re-settlement will force development of newer areas
- Planned adaptation built on past experience

Gainers vs. Losers

- **Gainers**

- Science based producers
- Access to fresh water
- Peri urban producers with low transport cost
- Saline farms in water logged areas
- Farms with International linkages and know-how
- Organic producers,

- **Losers**

- Marginalized, landless, rural women and children
- Those forced to resettle and in extreme event areas,
- Non flexible agriculturist
- Absentee landowners

Action Agenda

- Inventorize technology from World pool suited to reduced irrigation and drought conditions
- Forecast demand/supply for current and potential enterprises i.e. olives, shrimp
- Seriously watch bio fuels
- Establish a climate Change Adaptation Center in Punjab
- Develop International carbon credit program with practical considerations
- Educate masses on vagaries and opportunities of cc