Desert Locust Geospatial Monitoring System

Ibrar ul Hassan Akhtar

M Phill (Entomology), MS Remote Sensing (UK), PhD in Climate Science (Thesis Submitted)

General Manager

National Agriculture Information Centre

Pakistan Space and Upper Atmosphere Research Commission

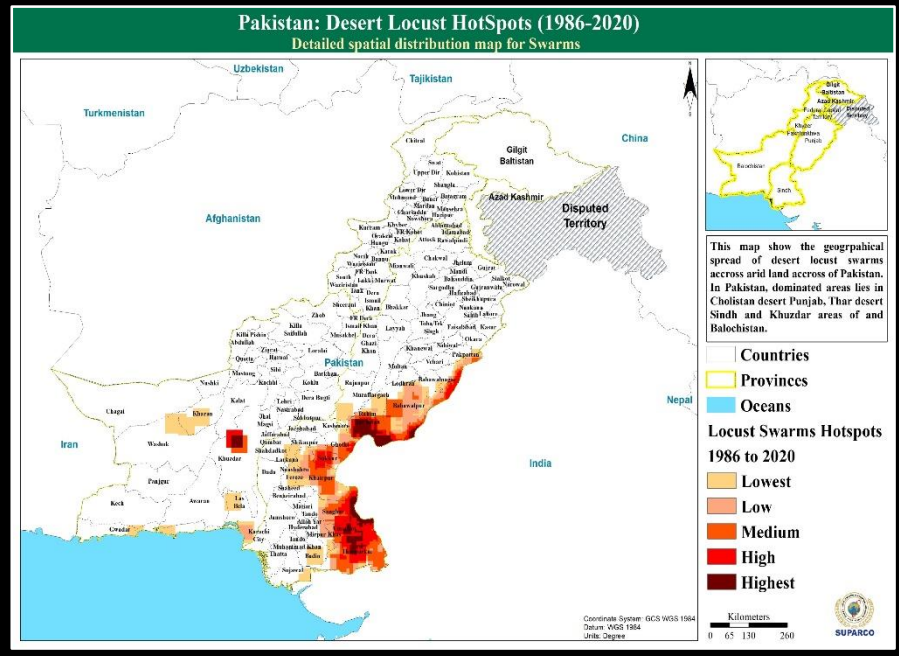
Pakistan: Desert Locust Invasion History

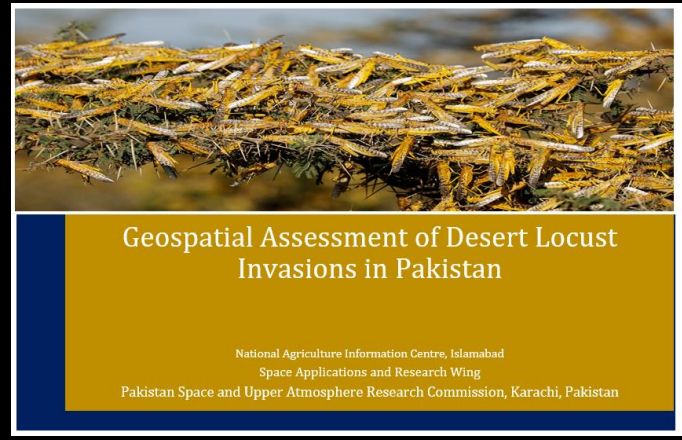
Table 1: Historical information of annual desert locust swarms, hopper bands and adults (Source: DLIS, FAO of the UN)

Year	Number of Swarms	Area Affected (ha)
1986	1	Not Reported
1989	31	Not Reported
1990	12	Not Reported
1993	374	95,258
1996	8	Not Reported
1997	50	8804
1998	8	Not Reported
2001	1	Not Reported
2003	11	Not Reported
2005	21	320
2007	3	580
2010	10	2,510
2016	3	1,200
2019-2020	32	16,700
Total	**565**	**1,25,372**

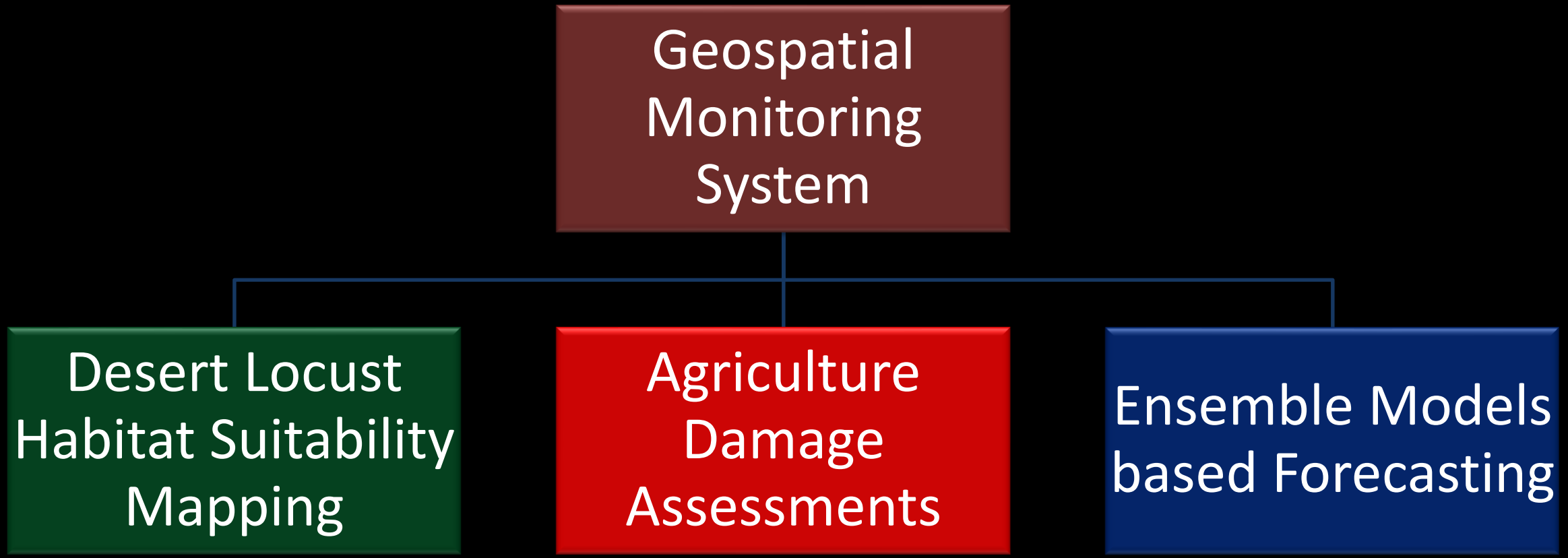
Year	Number of Bands formation	Area Affected (ha)
1986	2	Not Reported
1989	28	33,500
1990	12	33,400
1992	2	200
1993	1205	3,95,153
1996	7	Not Reported
1997	233	56528
2005	159	169
2007	3	200
2010	26	6,398
2011	7	730
2019-2020	95	6,977
Total	**1779**	**5,33,255**

Year	Adults population	Area Affected (ha)
1985	153	Not Reported
1986	413	Not Reported
1987	79	Not Reported
1988	33	Not Reported
1989	68	100
1990	107	18,200
1992	121	300
1993	68	200
1994	155	Not Reported
1995	96	Not Reported
1996	14	Not Reported
1997	350	6,304
1998	354	3,745
1999	364	625
2000	194	Not Reported
2001	214	Not Reported
2002	131	Not Reported
2003	229	6,957
2004	133	1,345
2005	252	13,069
2006	38	1,811
2007	230	13,528
2008	240	13,526
2009	128	12,593
2010	492	94,726
2011	385	38,840
2012	106	3,384
2013	88	897
2014	60	795
2015	24	1,740
2016	95	5,597
2017	40	2,970
2018	12	1,120
2019-2020	2,395	6,57,855
Total	**7,861**	**9,00,227**





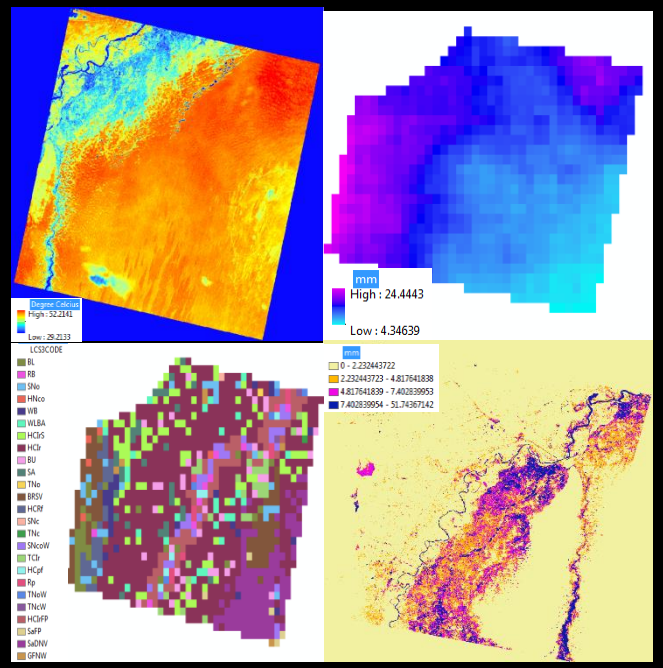
Monitoring System Component



Geospatial Habitat Suitability Mapping

Key Environmental Variables data

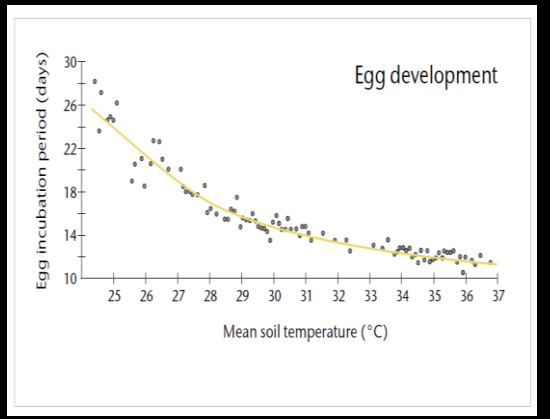
- Land Surface Temperature
- Precipitation
- Soil Moisture/NDWI
- Land use Land Cover
- Air Temperature
- Wind (U&V)
- Green Indices
- Evapotranspiration
- Topography
- Soil type

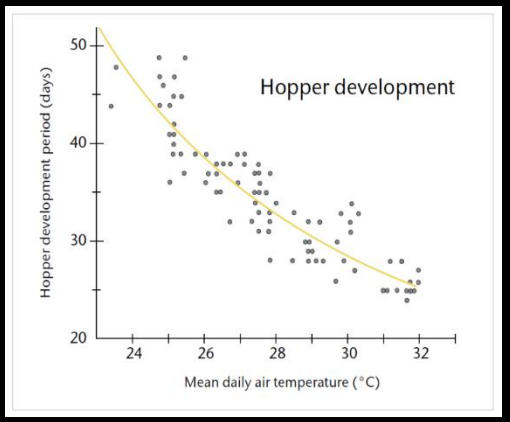


Coupled Modeling approach based on Markov Chain Process, Neural Network Model and Decision Tree Algorithm based Multi-Criteria Decision Analysis

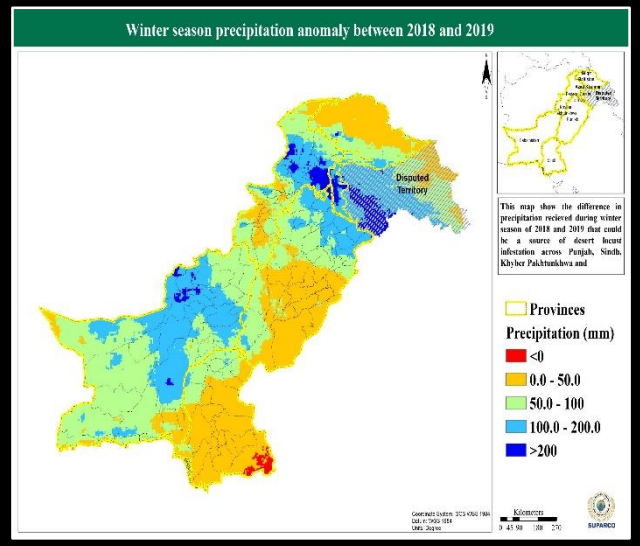
Key Locust Specific Parameters

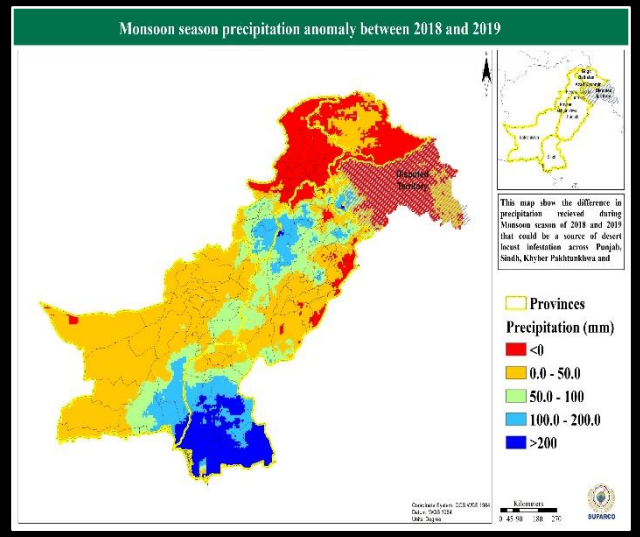
- Season rains amount and intensity
- Dust storm and direction
- Wind speed and direction
- Temperature requirements for egg and nymphs development
- Soil moisture requirements for egg laying
- Vegetation cover density and types
- Elevations

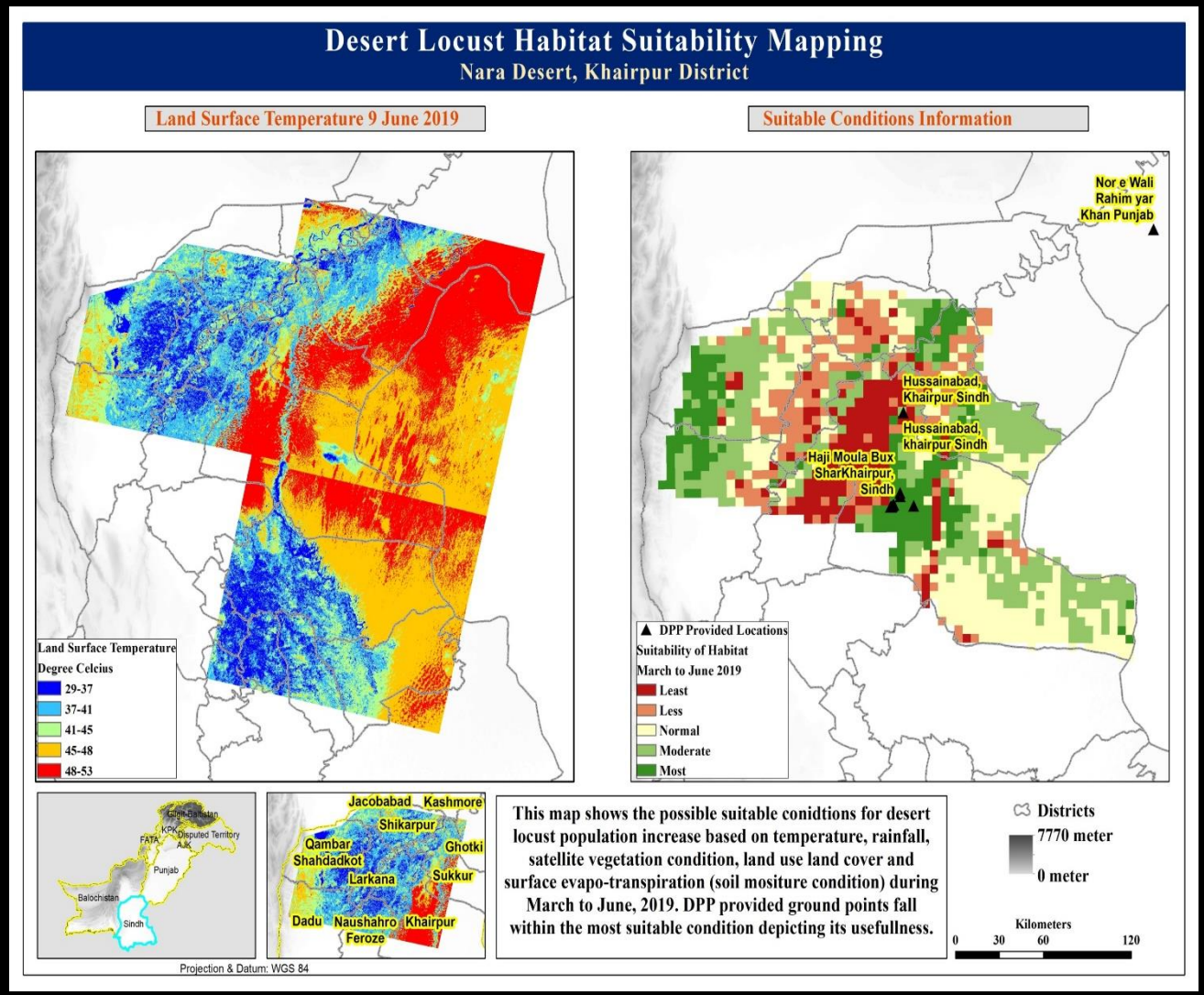




Geospatial Habitat Suitability Mapping







http://disasterwatch.sgs-suparco.gov.pk/?map=desertlocust

Thank you

Q&A