# MAPPING AND MONITORING LOCUST HABITATS IN THE ARAL SEA REGION BASED ON SATELLITE EARTH OBSERVATION DATA

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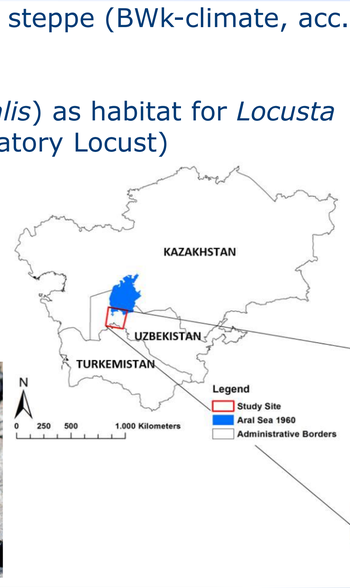
## Highlights

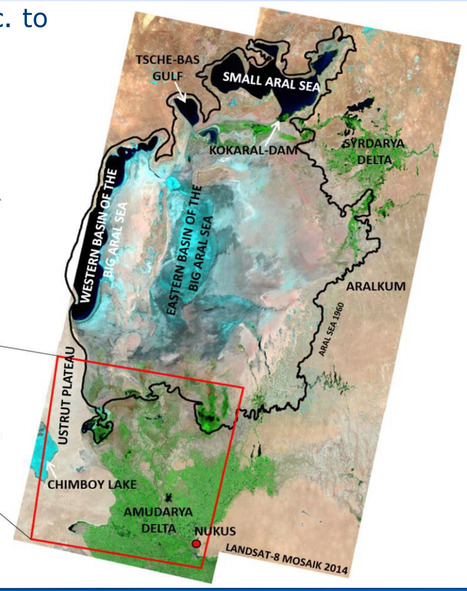
- Created synthetic data set based on fusion of Landsat and MODIS sattelite data in the southern Aral Sea region
- Created first archive of high spatial resolution maps of land cover and locust habitats
- Provided baseline data sets for improved locust management

## Study Site

- Semi-arid climate zone of the dry steppe (BWk-climate, acc. to Köppen & Geiger)
- Common reed (*Phragmites australis*) as habitat for *Locusta migratoria migratoria* (Asian Migratory Locust)

[10]




## Data and Methods

**Remote sensing data**
- MODIS (MOD09Q1, 8-day surface reflectance)
- Landsat-5
- 2006 – 2009; April – October

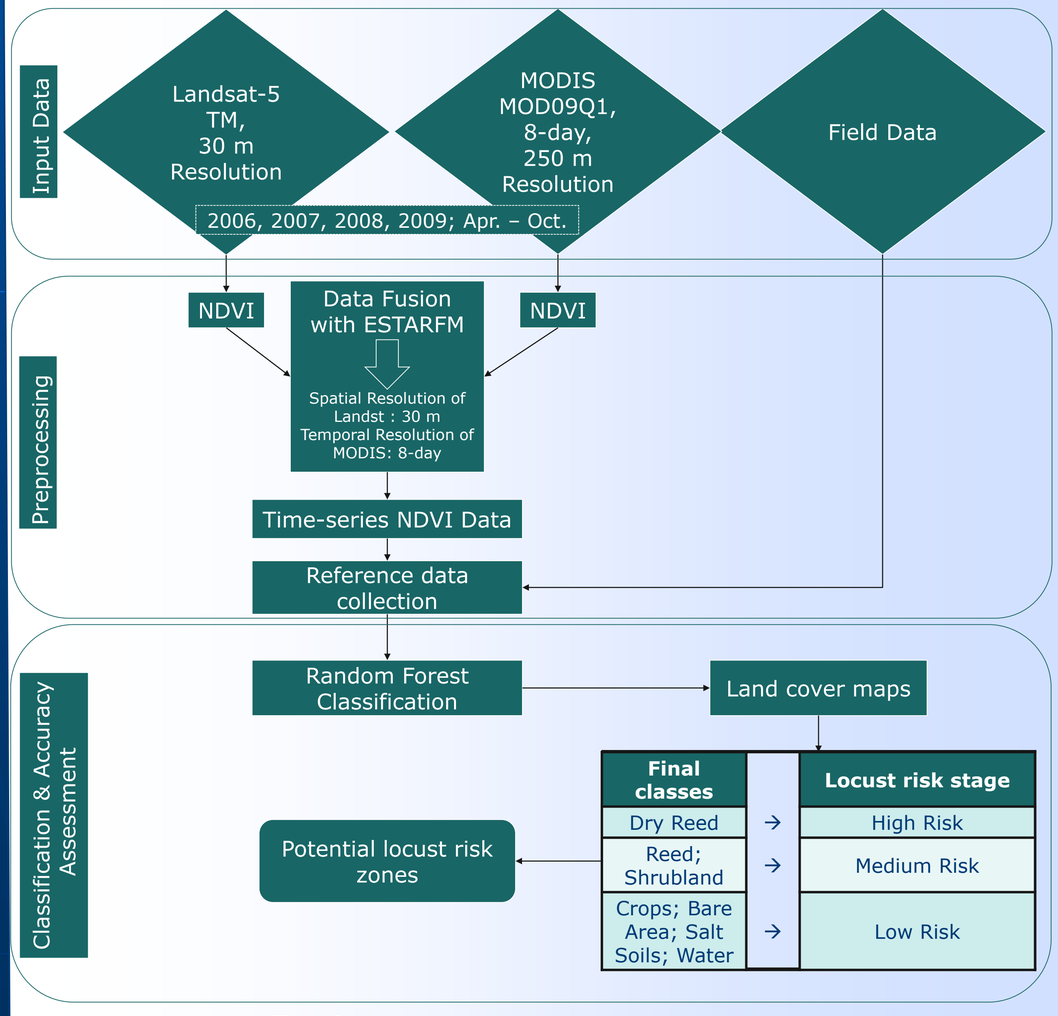
**ESTARFM** [4]
- New dataset with temporal resolution of MODIS (8-day) and spatial resolution of Landsat (30m)
- Quality control: $r^2$ and rmse

**Fielddata**
- Collected on fieldtrips in the years 2006, 2007 and 2009

→ Information about landcover and locust-sightings on site

- Inflowdata from Amudarya River at Nukus

**Methods**
- Calculate a vegetation index (normalized diference vegetatio index = NDVI) based on MODIS and Landsat scenes
- Blend Landsat and MODIS NDVI images in each observation year based on the STARFM algorithm [1]
- Classification with **Random Forest (RF)**

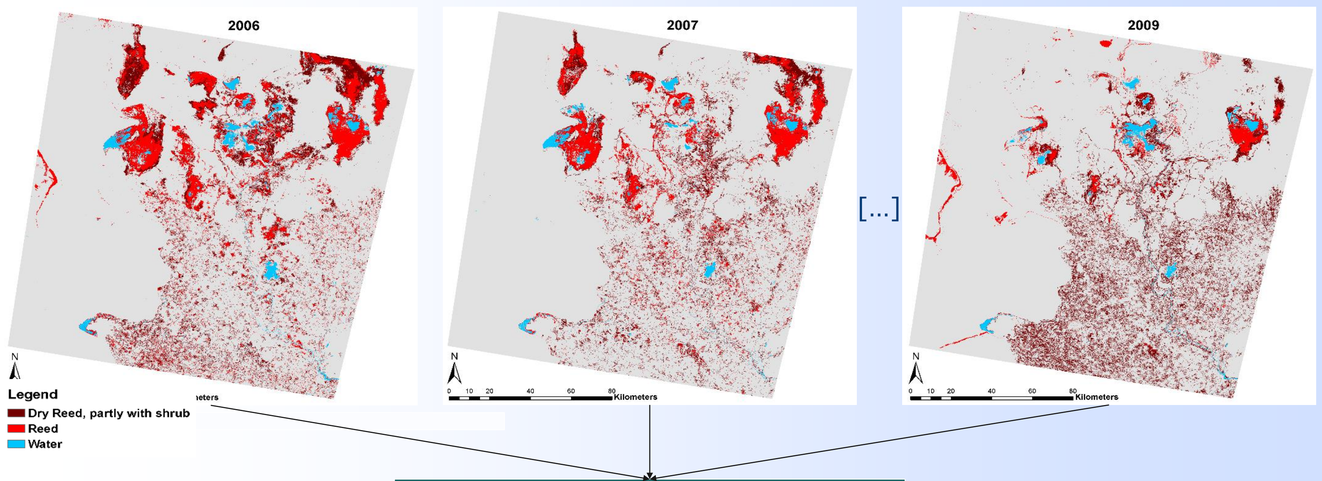



**Landuse classification**
- Classification of every single year (2006, 2007, 2008, 2009)
- With multi-year RF model

**Locust risk zones delineation**
- Sum-up locust-risk classes
- Create high-spatial resolution maps of potential locust risk areas

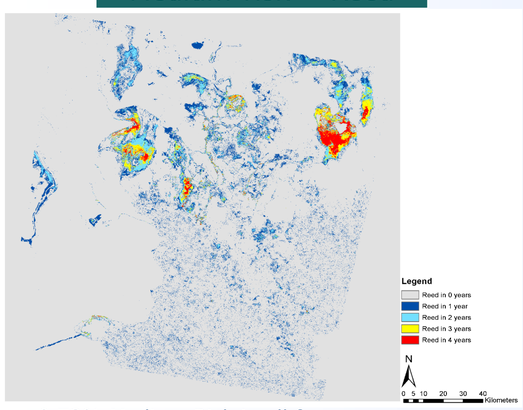
## Results

Potential Locust-risk zones per year



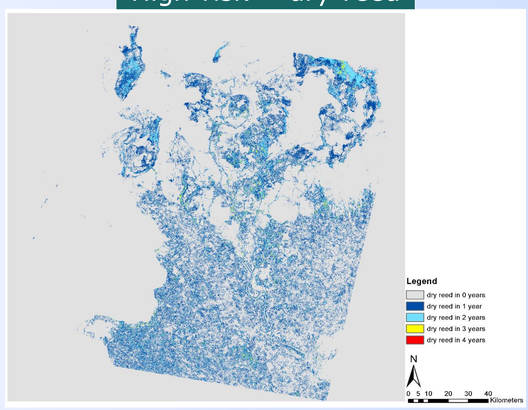

Potential Locust-risk zones mulit-year

Medium-risk = Reed

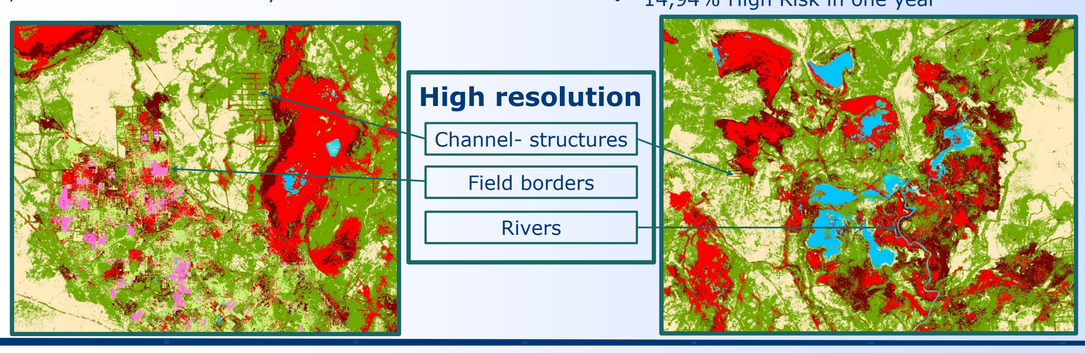



- 0,73% Medium Risk in all four years
- 1,21% Medium Risk in three years
- 2,22% Medium Risk in two years
- 6,77% Medium Risk in one year

High-risk = dry-reed




- 0,2% High Risk in all four years
- 1,52% High Risk in three years
- 6,38% High Risk in two years
- 14,94% High Risk in one year




## Conclusion / Outlook

- In order to prevent large agricultural areas from devastation by locusts, it is important to make valid forecasts about locust development
- The identified developments within the different land cover classes can be explained and confirmed with the Amudarya inflow data as measured at Nukus and can be confirmed with corresponding literature
- The area of these risk zones was always less than the area surveyed against LMI in the observed years
- Focus zones with a potential high risk for locust breeding areas where derived from the classification maps, and can help the survey teams to work more efficient on-site
- Derive within-season information and get early information about the location of potential locust breading areas

## References

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