Proposed Research Project on

Impacts of Climate Change on Agricultural Production (ICCAD)

In Arid Regions, Egypt

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1. Introduction

With the increasing international and national interest in the climate and its impact on the fields of environment, economic, agricultural production and social development, the Environment and Climate Research Institute (ECRI), Egypt and the Research Institute of Humanity and Nature (RIHN),Japan have found it is necessary to have a join research project in one of these problems. This is by establishing academic foundation to develop measures to address the impact of climate change on agriculture production.

There was always a great concern in Egypt about the climate impacts which goes back to 1866. In this year the first two Meteorological stations was founded. This was followed by establishing other 33 stations in addition of 20 stations for rainfall along the years up to 1931. Now there are in the Delta only more than 75 Meteorological stations working for 24 hours a day.

There are many activities being done to secure future resources. Some of these activities are very advanced like those of the Nile Forecast center of the Egyptian Meteorological Authority (EMA), the Central Laboratory for Agricultural Climate (CLAC) and the Nile Forecast Center, while some others are characterized by the lack of recent technology and advanced communications with other relevant parties.

These studies cover several disciplines and involve many research institutes and agencies who recognize expected future threats due to climate change.

Many of these studies have good scientific foundations and outputs which are based on serious efforts during a relatively long periods.

The main objective of these institutions is to study the impacts of climate change on water resources in Egypt.

Most of these studies are done in isolation and not in an integrated format that would serve one common objective like "avoiding threats to food production".

The Egyptian studies can be utilized and used to build upon in order to produce more beneficial conclusions to enhance our understanding in dealing with adaptations to climate change impacts.

In general, we think that extra work is needed to have in depth analysis for most of the existing available data and studies, and this can be done in collaboration with the Japanese team.

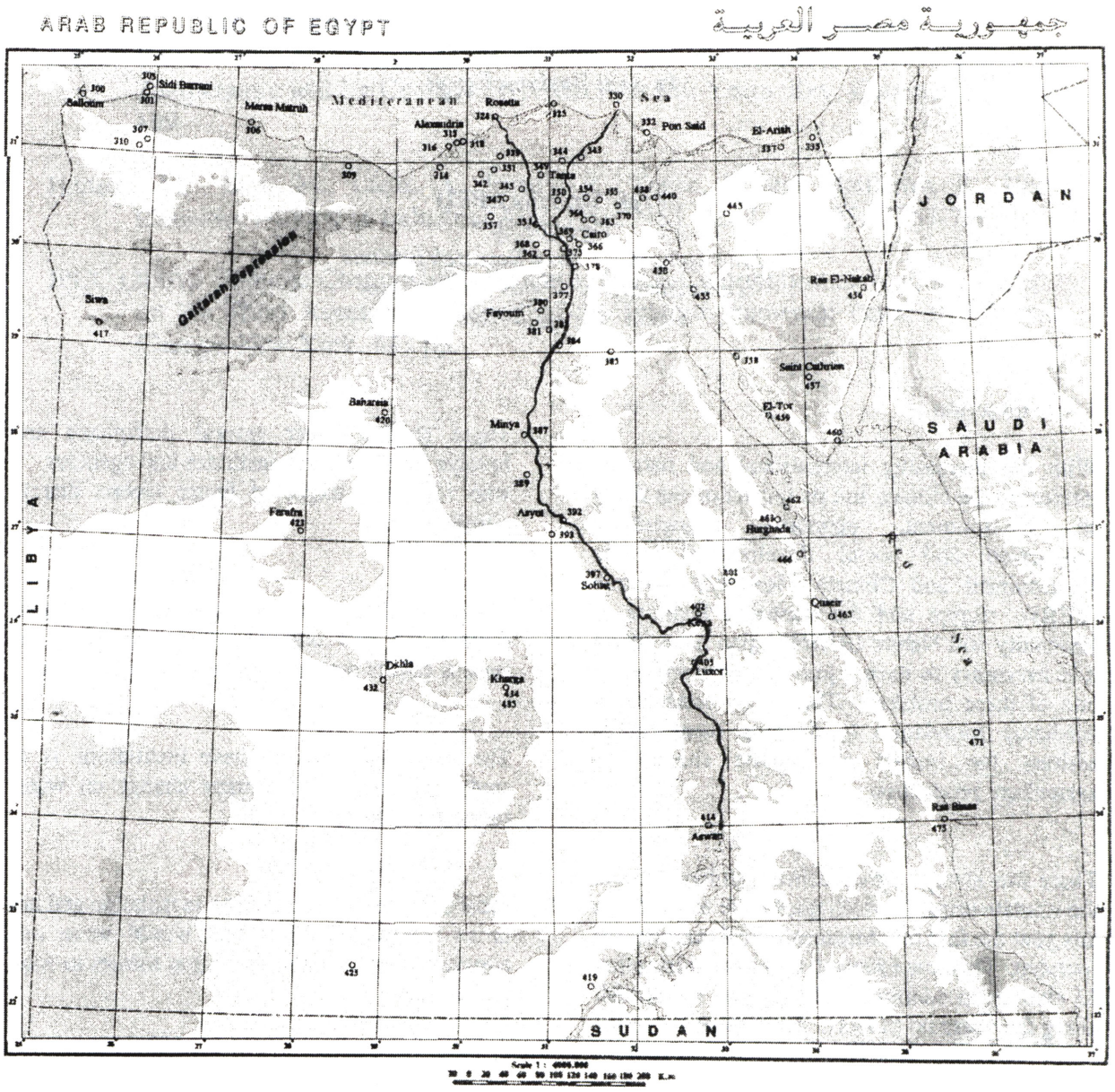


Figure 1. Main meteorological stations (EMA,1996)

Table 1. Sample of meteorological element measurements

Station No.	Station Name	latitude o ' N	Longitude o ' E	altitude meter	Measured met. Elements @					
					1	2	3	4	5	6
300	Salloum	31 32	25 11	4.00	*	*	*	*		*
301	Sidi Barrani $	31 37	25 54	23.71	*	*	*	*	*	
306	Mersa Matruh	31 20	27 13	25.00	*	*	*	*	*	*
308	Ras El-Hekma	31 14	27 52	91.34	*	*	*	*		
309	Babbaa	30 56	28 28	17.00	*	*	*	*	*	*
316	El-Dekhela	31 08	29 48	2.53	*	*	*	*		
318	A;examdroa (Nouzha)	31 12	29 57	-1.78	*	*	*	*	*	*
324	Rosetta	31 23	30 24	1.70	*	*	*	*		
325	Baltim	31 33	31 06	1.00	*	*	*	*		
330	Damietta	31 25	31 49	1.98	*	*	*	*	*	*
332	Port Said	31 17	32 14	0.80	*	*	*	*	*	
337	El-Arish	31 05	33 49	30.57	*	*	*	*		*
339	Damnhour	31 02	30 28	2.38	*	*	*	*		
342	Glanaclis	30 49	30 12	8.11	*	*	*	*		
343	El-Mansoura	31 00	31 27	4.25	*	*	*	*	*	
345	Tahrir $	30 39	30 42	15.60	*	*	*	*	*	
349	Tanta	30 49	31 00	6.40	*	*	*	*	*	
350	Quesna	30 35	31 08	9.15	*	*	*	*		
351	El-Khatatba	30 19	30 52	15.23	*	*	*	*	*	
354	Zagazig	30 35	31 30	8.27	*	*	*	*		
357	Wadi El-Natroon	30 24	30 22	48.98	*	*	*	*	*	
360	Shbeen El-Koom	30 36	31 01	11.50	*	*	*	*		
364	Anshas	30 23	31 28	29.77	*	*	*	*		
365	Bilbeis	30 24	31 35	29.48	*	*	*	*		
366	Cairo (Air port)	30 08	31 24	64.12	*	*	*	*		*
368	West Cairo	30 06	30 54	163.34	*	*	*	*		
369	Bahtim $	30 18	31 15	16.90		*	*	*	*	
370	El-Katameia	30 03	31 50	244.70	*	*	*	*		
371	Cairo (H.Q.) S #	30 05	31 17	34.40						
375	Giza $	30 03	31 13	18.65					*	
377	Helwan	30 29	31 12	44.02	*	*	*	*	*	
380	Koom Osheem	29 33	30 53	1.28	*	*	*	*		

(+) Altitude of station ground above M.S.L. (meter).
($) Global solar radiation measurements.
(#) Ozone Measurements.
(@) Measured meteorological elements:

1- atmospheric pressure. 2- air temperature 3- relative humidity
4-rainfall 5- sunshine duration hour 6- surface wind

2. Objectives

The prime objective of this proposed project ICCAP is to aid the Ministry of Water Resources and Irrigation and other concerned ministries like; the Ministry of Agriculture and the Ministry of Environment, in building capacity for developing state-of-the-art climate change scenarios, impacts, and adaptation policies, and for assessing and strenghtening adaptive capacity to the threats of climate change.

To assess the vulnerability of agricultural production due to climate change impacts and to prepare adaptation measures to enable coping with the expected changes. This will be done with special reference to land and water management, and inter-relationship between natural resources and human society. Fundamentally, the ICCAP aims at clearly understand the cycle of interactions between humans and natural systems, and to build a new research field of the global environment, adopting more integrated, inter-disciplinary overall perspectives.

Objective 1:
To produce, in our region, more accurate prediction for future climate change scenarios.

Objective 2:
To investigate, all possible climate change impacts on the natural resources and food production in the country, and other relevant effects.

Objective 3:
Study and prepare mitigation policies to avoid threats of the expected impacts.

Objective 4:
Building capacity and train staff in the area of climate change in different sectors to be able to deal with future threats and include new aspects and considerations within planning, design, and implementation of their projects.

Objective 5:
Disseminate the information to decision-makers, stakeholders and awareness.

3. Methodologies

The assessment of vulnerability would be based on the impacts with/without climate changes. Without climate changes means buisness as usual. On the other hand, with climate changes means more requirements and less resources. In this respect, it could be investigated through the following activity components.

- Review of the existing climate change scenarios and their applicability.
- Investigate available climate models (Global and Regional).
- Select, use, calibrate and validate a regional model "with a reasonable precision" to simulate future changes affecting Egyptian conditions and resources.
- Analysis of local climate system with the past climate information.
- Analysis of possible impacts in Egypt on water resources and water management agriculture and food production, sea level rise and land-use & land-cover.
- Investigate adaptation strategies, and implementation in different sectors.
- Capacity building of staff to deal with the previous components.
- Dissemination of the results to decision makers and stakeholders.
- Public awareness.

4. Research Area

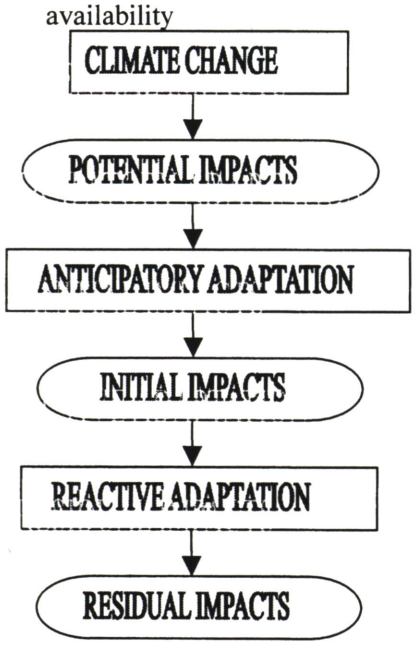
For a start, the research area should be an area with specified hydrologic boundaries like an irrigation canal in the delta and another one in the valley. It should have some criteria like hydrological boundaries, accesibility, data availability, institutional framework, and impacts of climate changes are expected clearly.

5. Framework

To set the project period and to schedule the time frame for activities required, each expert or study group would break down its studies and activities.

The following represent an overall frame work for the proposed study items:

- Review
- Data collection for each branch
- Data processing
- Data analysis
- Vulnerability assessment
- Adoptation measures
  - Changes in irrigation practices
  - Cropping paterns
  - Improve management procedures
  - Introduce new resources
  - Examine and define the relation between water consumption and water availability



6. Team-work

This project has a multidisciplinary nature and needs strong and interrelated active cooperation. Therefore, we propose to have six different groups/teams for which clear and parallel objectives. This will be outlined and carefully designed in details with the corresponding Japanese teams. Besides, this requires intelligent, wise and clever management all over the project duration. We believe this can be possible through the join work between ECRI and RIHN. ECRI is assigned from the Minister of Water Resources and Irrigation to coordinate the other agencies towards the implementation of the project.

The following describes the intended group's titles and participating agencies/institutions in each group.

Group a) Climate Prediction
- **Climatologists and Meteorologists**

: *Egyptian Meteorologicl Authority EMA, Meteorology Dep. , (Met. Data/model).*
: *Meteorology Department (Cairo University).*
: *Nationa Authority for Remote Sensing and Space Science NARSSS (land-use data).*
: *ECRI (NWRC).*

Group b) Basin Hydrology and Water Resources
- **Hydrologists and Water resources scientists**

: *Nile forecast center , ECRI (NWRC).*
: *High Aswan Dam HAD authority.*
: *Irrigation Sector.*
: *ECRI (NWRC).*
: *Ain Shams University.*

Group c) On-Farm dynamics (soil-water-air-plant)
- **Agronomists, Agro-Meteorologists, and Irrigation Scientists**

: *Central Laboratory for Agriculture Climate (CLAC.)*
: *Soil-Water-Environment Research Institute (SWRI).*
: *ECRI (NWRC).*

Group d) Irrigation and Drainage System
- **Irrigation, and Water Distribution scientists**

: *Irrigation Sector*
: *ECRI (NWRC).*

Group e) Sea-Level Rise evalution
- **Hydro-Geologist, Coastal Engineers/ Scientists , Economists**

: *Groundwater Research Institute GWRI & Coastal Research Institute CRI & ECRI (NWRC.*
: *Environment Institute (Alexandria).*
: *Ain Shams Uniersity.*

Group f) Social and Economical Evaluation
- **Agro-Economists, and Sociologists**

: *ECRI (NWRC).*
: *Agro-Economic Instiute.*
: *Ain Shams University.*

7. Work-Plan

- Coordination / organization
- Specific roles/responsibilities
- Sequence of activities
- Duration
- Deliverables
- Equipment
- Training

8. Expected Outputs

The expected outputs are :

1. A realistic prediction for future climatic changes that might have impacts on Egypt based on a validated regional climate model.

2. Assessment for possible climate change impacts on the following sectors:

   - Water resources management (supply and demand).
   - Agricultural production.
   - Sea level rise.
   - Changes in Land-use and Land-cover Mitigation policies that meet future climate change threats in the above mentioned sectors and reduce existing uncertainties for decision-makers and stakeholders.

3. Transferring proofed experience and technology to local Egyptian conditions.

- Training and capacity building for the staff of the relevant Institutions.
- Guidelines and methodologies to be included in the design and planning for the project with an objective to have consideration for possible climatic changes.
- Public awareness about climate change threats.
- A network between all participants and institutions involved in the project inside and outside Egypt.

9. Budget

Estimated cost: $ 4 Million.
Breakdown is needed for all items.

10. Finance

It is planned to have a co-finance this program through the support of different national and international agencies.

It will initiate from the Egyptian Government through existing Governmental investments in the research institutes of the NWRC and other Egyptian participating agencies, coordinating by the ECRI..

International donors who might have Interest in the project objectives (UNDP-GEF, JICA and CIDA).

11. Duration and Time Schedule

Estimated 4 years Need a schedule according to the work-plan

12. References

Egyptian Meteorological Authority, "Climatic Atlas of Egypt", Ministry of Transport and Communications, Cairo, Egypt, 1996.