

**Proposal  
Host Institution for the African Climate change Fellowship  
Program**

**1- PROPOSING HOST INSTITUTION**

**Name of Institution :** Université Cheikh Anta DIOP  
**City and country of location :** Dakar, SENEGAL  
**Type of institution :** University  
**Primary mission of Institution :** Education and Research  
**Secondary mission of Institution:** Service  
**Main thematic areas of work:** Climate Change Science, Climate Modelling, Oceanography, Coastal erosion, Water Resources.  
**Working language of the Institution:** French

**2- PROPOSAL LEADER**

**Name:** Amadou Thierno Gaye  
**Title :** Dr, Associate Professor  
**Mailing Address:** Laboratoire de Physique de l'Atmosphère et de l'Océan Siméon Fongang (LPAO-SF) Po Box 5085 Dakar Fann, Sénégal  
**Telephone:** (00221) 33 825 93 64  
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**3- COLLABORATING INSTITUTIONS**

a-

**Name of Institution :** IPSL /CNRS (LMD, LOCEAN)  
**City and country of location :** Paris, France  
**Primary mission of the institution:** Research, Training  
**Secondary mission of the institution:** Service  
**Main thematic areas of work:** Climate Modeling.  
**Working languages of the institution:** French  
**Name and title of principal contact person :** Frédéric Hourdin, Dr  
**E-mail address of principal contact person:**  
[Frederic.Hourdin@lmd.jussieu.fr](mailto:Frederic.Hourdin@lmd.jussieu.fr)

b-

**Name of Institution:** Howard University  
**City and country of location :** Washington DC, USA  
**Primary mission:** Education, Training and Research  
**Secondary mission of the institution:** Service  
**Main thematic areas of work:** Atmospheric Sciences.  
**Working languages of the institution:** English  
**Name and title of principal contact person :** Dr Gregory Jenkins, Head of Physics Department  
**E-mail address of principal contact person:** [gjenkins@howard.edu](mailto:gjenkins@howard.edu)

**Name of Institution:** ENDA-Energie  
**City and country of location :** Dakar, SENEGAL  
**Primary mission:** NGO  
**Secondary mission of the institution:** Service  
**Main thematic areas of work:** climate change adaptation  
**Working languages of the institution:** French, English  
**Name and title of principal contact person :** Dr Jean-Philippe Thomas  
**E-mail address of principal contact person:**  
[enda.energy@orange.sn](mailto:enda.energy@orange.sn)

#### **4- FELLOWSHIP EXPERIENCE TO BE OFFERED**

The Laboratories, departement and Faculties of the UCAD team have long experience on research, training and education including :

- research and training conducted in PhD programs, doctoral Schools and Master programs
- training specialists and experts in climate change and environment including physics and chemistry of the climate, marine and coastal geology, water resources
- provision of expertise for the benefit of governmental, non governmental and private institutions in climate change vulnerability and Adaptation assessments.

The team members are also involved in many national (National Climate change committee, IWRM process ...), regional (FRIEND-AOC, PACOM, ...), and international expert groups (IPCC, GEWEX, ...). On that respect they have coordinated climate change projects and played key roles in international research projects. They also have been involved as advisors in many National Communications to UNFCCC and NAPAs of several African countries. The involvement of team members in African expert network related to climate change will be really instrumental for the development of the Fellowship programs; It will help to connect with African experts and also potential fellows.

The UCAD team has developed expertise and have long experience of investigation in various issues of climate change.

#### **Physical Climate Sciences**

The team has a strong climate modelling component and also include analysis, diagnostic studies, model evaluation, remote sensing of climate and earth (rainfall estimation with satellite and radar,...). The studies on

climate and ocean processes helps to improve climate models mainly in Africa. This will help to build adaptation options considering need of better present day and future (at different time scales) climate projections. The seasonal and intraseasonal climate futures are key important scales considered. At these scales climate has strong influence to many sectors as agriculture and food production, water resources, health, etc... The team is involved in the investigation toward better predictions of intraseasonal and seasonal climate and also prediction of these impacts on key sectors. Efforts made for the downscaling of climate models outputs at local and regional scale are important. They include implementation of regional climate models and development of statistical methods.

#### **water resources :**

UCAD team is also investigating water resources and how they are impacted by Climate change. This area of research is well covered in different Institutes and department in UCAD. They mainly deal with: water issues in estuaries and rivers (Senegal, Gambia, Casamance), surface water and groundwater evaluation. Team members have also investigated water ponds and small stream flows. The water quality, availability and use by populations is also an important topic of investigation.

#### **Coastal erosion :**

The team has conducted a vulnerability and adaptation assessment for the Senegalese coastal zone and has been involved at different levels (national to regional) in different V&A assessments of coastal zones of other countries, building a strong expertise. The team located at the geology department has a good experience in methodologies (Bruun rule, calculations of saline intrusion in the aquifers, etc.) to develop such assessments. There is also a good experience in coastal protection works that could be considered as one of the adaptation options in case of coastal erosion. Good connections with other centers in Africa as well as a multidisciplinary spirit are key to the capacity building.

#### **Emerging diseases :**

The physical and dynamical mechanisms relating climate variability, environmental changes and health are important topics of investigation for the UCAD team. Changes on the climate and natural environment associated to infrastructure and socio-economic practices have strong impact on diseases (malaria, Rift Valley Fever, yellow fever, meningitis, ...). The team is documenting the geophysical characteristics and case studies of the epidemics of FVR and malaria in Senegal. FVR is used as an example of an emerging disease strongly linked to climate and hydrology. This work is being generalised to malaria. The aim is to build at the end a bioclimatic model and also decision making tool (part of an Early warning System) integrating the climate knowledge.

In all these sectors, UCAD can offer to the Fellow valuable training, advisors for their research and also help for the mainstreaming of the knowledge gained and tools to decision making process and society.

## **5- Administrative and cost issues**

5-1 : 2 to 3 visiting fellows

5-2 : October- November

5-3 : 500- 600 Euros

5-4 : direct cost and fees : 2500 Euros

5-5 : Other requirement : BSc graduation at least

## **6- Qualifications of the host institution :**

### **6-1 : Institutionnal capacity**

UCAD team has long and diversified experience on climate change issues. Team members have authored many papers and report especially the IPCC reports. Two of them have been involved in the IPCC Assessment Report 4. UCAD tea memebers can be counted among scientists playing a leading role in climate change in Africa. They usually participate to foras, conferences, workshops and leaders of important projects and programmes in climate change. The new pedagogic curricula in UCAD gives also to the team good momentum to interact better. They all are contributing to the Doctoral Schools in Water, quality and use. This will be instrumental for reaching critical mass of experts able to address large spectrum of climate change sciences and adaptation. The delivery of Masters degree related to climate issues is also a piece in the puzzle.

### **6-2- Project experience**

There team has been involved an many projects and programme at national, regional and international levels. A sample can be given here.

- Project Building climate change Scenarions in Senegal  
the objective of this project was to build climate change scenarios for Senegal. These scenarios have been later usd on vulnerability studies on sectors of water rressources, agriculture and coastal zone.
- AIACC Project : Assessment of Impacts and Adaptation to Climate Change (START/ UNEP/TWAS)  
team members were in charge of one African teams « assessment of regional and global climate models »
- Rift Valley fever: study of the environmental conditions related to RVF emergences in Ferlo region in Senegal

- AMMA programme: African Monsoon Multidisciplinary Analysis is an international programme investigating the African Monsoon and his impacts on both society and environment. Mainly how the very long drought has affected ecosystems, society and economy in West Africa is a central issue in AMMA. The team members are very active in AMMA and are leading many activities in the science and the african group.
- Team members have insured quantity of workshops, training courses and conferences related to climate change, coastal zones issues, integrated climate risk. UCAD team members ae participating also in the ACCA project as contributors in projects and also trainers in workshops.
- Vulnerability and adaptation assessment of the Senegalese coastal zone
- LOICZ/UNEP/START: Coastal impacts of water abstraction and impoundment in Africa. A proposal to START for an AfriCat foundation project LOICZ (Land-Ocean Interactions in the Coastal Zone) : (Africat) : African Catchments. Catchments changes and their impact on the coast.
- Regional project : Vulnerability of water resources to environmental change in Africa. UNEP; co-chair with Abel Afouda, Benin (until 2003) and Lekan Oyebande (Nigeria) since 2004.
- UNESCO : Application de la télédétection à la gestion intégrée des écosystèmes et des ressources en eau en Afrique.
- Few students grants funded by START, AMMA, French Cooperation over many years

### **6-3- Publications Record**

NIANG-DIOP, I. (1998) Les études de vulnérabilité aux changements climatiques : le cas des pays africains côtiers. *Bull.Africain*, Dakar, n°10, 25-37, 1 fig., 7 tab.

GUEYE, K., NIANG-DIOP, I. (1999) Coastal protection works in Senegal : Example of the Rufisque dikes. In : Proceedings of the 5<sup>th</sup> International conference on Coastal and Port Engineering in Developing Countries, Cape Town, 19-23 avril. Vol.1, 760-775, 6 fig., 8 tab.

SARR, R., NDIAYE, P.M., NIANG-DIOP, I., GUEYE, M. (2000) Datation par les Foraminifères planctoniques d'une activité volcanique d'âge lutétien à Toubab Dialaw (Sénégal occidental). *Bull. Soc. Géol. France*, Paris, **171**(2), 197-205, 2 fig., 3 pl. ph.

FAYE, S., NIANG-DIOP, I., CISSE FAYE, S., EVANS, D.G., PFISTER, M., MALOSZEWSKI, P., SEILER, K.P. (2001) Seawater intrusion in the Dakar (Senegal) confined aquifer : calibration and testing of a 3D finite element model. In : Seiler, K-P. and Wohnlich, S. (eds) « New Approaches Characterizing Groundwater Flow », A.A. Balkema, Lisse, 1183-1186, 5 fig., 1 tab.

ETONGUE MAYER, R., NIANG-DIOP, I. (2001). Inventaire et évolution des formes littorales : cas de la presqu'île du Cap Vert (Sénégal occidental). Cah. Géol., Paris, **138**, 1935-1950, 3 fig.

NIANG-DIOP, I., DANSOKHO, M., FAYE, S., GUEYE, K., NDIAYE, P. (2004). Les impacts des changements climatiques sur les zones côtières du Sénégal : Exemples de la presqu'île du Cap Vert et de l'estuaire du Saloum. Colloque International Hugues Faure, « Quaternary and Global Changes : Review and Issues », Orléans, Vol. des résumés, 62-63.

NIANG-DIOP, I. (2005). Impacts of climate change on the coastal zones of Africa. In: IOC (ed). Coastal Zones in sub-Saharan Africa. A scientific review of the priority issues influencing sustainability and vulnerability in coastal communities. London, 27-28 May 2003. UNESCO, Paris, IOC Workshop Report n°186, ICAM Dossier n°4, 27-33, 1 tab.

NIANG-DIOP, I., BOSCH, H. et al. (2005). Formulating an adaptation strategy. In : Lim, B. and Spanger-Siegfried, E. (eds) « Adaptation Policy Frameworks for Climate Change : Developing Strategies, Policies and Measures ». Cambridge University Press, Cambridge, 183-204, 4 fig., 4 ann.

NIANG-DIOP, I., DANSOKHO, M., DIAW, A.T., GUISE, A., LY, I., MATTY, F., SENE, A., DIOUF, P.S., GUEYE, K., NDIAYE, P. (2005). In: Van Drunen, M.A., Lasage, R. and Dorland, C. (eds) "Climate Change in developing countries. An overview of study results from the Netherlands Climate Change Studies Assistance Programme". IVM, Amsterdam, 101-109

NYONG, A., NIANG-DIOP, I. (2006) Impacts of climate change in the tropics: the African experience. In: Schellnhuber, H.J., Cramer, W., Nakicenovic, N., Wigley, T., Yohe, G. (eds): "Avoiding dangerous climate change". Cambridge University Press, Cambridge, 235-241, 1 tab.

BOKO, M., I. NIANG, A. NYONG, C. VOGEL, A. GITHEKO, M. MEDANY, B. OSMAN-ELASHA, R. TABO and P. YANDA, (2007): Africa. In: M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (Eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge UK, 433-467, 6 fig., 3 tab.

OTTER, L., OLAGO, D.O., NIANG, I. (eds) (2007) Global Change Processes and Impacts in Africa: A Synthesis. START/East African Educational Publishers, Nairobi, 346 pp.

NIANG, I., NYONG, A., CLARK, B., DESANKER, P., DIN, N., GITHEKO, A., JALLUDIN, M., OSMAN, B. (2007) Vulnerability, Impacts and Adaptation to Climate Change. In: Otter, L., Olago, D.O. and Niang, I. (eds) Global Change Processes and Impacts in Africa: A Synthesis. START/East African Educational Publishers, Nairobi, 226-249, 2 fig.

**Sow, B., A. Viltard, P. de Félice, A. Dème and A. Garba, 2004:** Are squall lines detected by reanalyses? *Meteorology and Atmospheric Physics*, DOI 10.1007/s00703-004-0083-x

**Nzeukou A., H. Sauvageot, D. Ochou et F. Kébé, 2004 :** Raindrop Size and radar parameters at Cape Verde, *J. Appl. Met*, 43, 90-105

**Gaye, A. T., A. Viltard et P. De Félice, 2004:** Lignes de grains et pluies en Afrique de l'Ouest: variations diurnes, *Sécheresse*, 15 (3), 287-292.

**Gaye, A. T., A. Viltard and P. De Félice, 2005:** Squall lines and rainfall over western Africa during summer 1986 and 87, *Meteor. Atm. Phys.*, DOI 10.1007/s00703-005-0116-0

Kamga A. F., G. S. Jenkins , **A. T. Gaye, A. Garba, A. Sarr, and A. Adedoyin, 2005:** Evaluating the National Center for Atmospheric Research climate system model over West Africa : Present-day and 21<sup>st</sup> century. *J. Geophys. Res.*, 110, D03106, doi:10.1029/2004JD004689.

**Sall, S. M., and H. Sauvageot, 2005:** Cyclogenesis of the African Coast : the case of Cindy in August 1999. *Mon. Wea. Rev.*, 133, 2803-2813.

**Kébé C. M. F, Sauvageot H. et Nzeukou A., 2005:** The relation between rainfall and area time integrals at the transition from an arid to an equatorial climate. *Journal of Climate*, 18, 3806-3819.

**Jenkins, G. S., A. T. Gaye and B. Sylla, 2005:** Late 20<sup>th</sup> century attribution of drying trends in the Sahel from the Regional Climate Model (RegCM3), *Geophys. Res. Lett.*, VOL. 32, L22705, doi:10.1029/2005GL024225, 2005

**Sall, S. M., H. Sauvageot, A. Gaye, A. Viltard and P. de Félice, 2005:** A cyclogenesis Index for Tropical Atlantic off the African Coasts; *Atmos. Res.*, Vol 79,2, pp 123-147

**Gaye, A. T., A. Viltard, et P. de Félice, 2005 :** Lignes de grains et pluies en Afrique de l'Ouest: part des lignes de grains à la pluie totale des étés 1986 et 87, *Sécheresse*, 16 (4), 269-273

Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, **A.T. Gaye**, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections.

In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S.,D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

**Sall, S.M.**, A. Viltard and H. Sauvageot, 2007: Rainfall distribution over the Fouta Djallon – Guinea. *Atmospheric Research*, **86**, 149-161

Lacaux J-P., Tourre Y. M., Vignolles C., **Ndione J.A.**, Lafaye M., 2007. Ranking Ponds from High-Resolution Remote Sensing: Application to Rift Valley Fever Epidemics in the Ferlo Region (Senegal), *Remote Sensing of Environment*, 106, 66-74

- **Ndione J. A.**, Diop M., Lacaux J.P., **Gaye A.T.**, 2006. Pluviométrie et émergence de la fièvre de la vallée du Rift FVR) dans la vallée du fleuve Sénégal : nouvelles considérations, Actes du 1<sup>er</sup> Colloque Francophone en Environnement et Santé (2006), Dakar, pp.1-7

#### **6-4- Experience hosting fellows**

Post doctoral fellows : 4

Doctoral fellows : 5

Policy fellows : none

Teaching fellows : 2

Others types fellows : 8 Master degree from sub-region countries.

#### **7- Qualifications of collaborating institutions**

##### **7-1- Institutional capacity**

IPSL ( Laboratoire de Météorologie Dynamique (LMD) and LOCEAN, Paris Those 2 Laboratories are members of the Institut Pierre Simon Laplace in Paris. They also belong to CNRS, the French national research center. They have developed global climat and ocean models, including coupled models. They have strong research activity in Climate change and have participated to the IPCC process. During the last AR4, the IPSL models was among the producers of climate experiences.

Howard University

The HU Program of Atmospheric Sciences is a strong team, with investigators with a very broad spectrum of research from atmospheric chemistry, aerosols, radar meteorology and climate modelling. They have participated and scientists have served as PI in the 2006 NASA AMMA experiences in Cape Verde, Senegal and Atlantic Ocean.

## **7-2 Relationship with host Institution**

IPSL ( Laboratoire de Météorologie Dynamique (LMD) and LOCEAN), Paris  
We have MOU with LMD through University Paris 6 for co-supervision of 4 PhD Thesis. Students are part time in UCAD and part time in Paris 6. We are partners with LMD in AMMA programme. Scientists of LMD and LOCEAN are visiting regularly LPAOSF, one Laboratory of the UCAD team. Also the scientists of LPAO are usually spend time to these labs to work on specific projects ideas in collaboration.

Howard University

This collaboration will be dedicated to the investigation on regional climate modelling, climate processes and studies of attribution of climate change. It can also include rainfall processes, aerosols and atmospheric chemistry. An MOU with HU is in progress and will allow: co-supervision of Thesis, development of training curricula, also visiting professors/scientists, PhD students, internships, ...

HU faculties have been hosted in UCAD labs as Fulbright. HU and UCAD have been associated to the NASA AMMA experiences in 2006 held in an area South West Dakar.

Laboratoire de Météorologie Dynamique

## **8- Supervisor/Mentor Team**

Hereafter the list of potential supervisors of Fellows.

a-

Name : Amadou Thierno GAYE

Title : Director of LPAO-SF, Université Cheikh Anta DIOP

Highest degree : PhD in Atmospheric Science of Université Cheikh Anta Diop de Dakar

Areas of expertise : Climate modelling, Assessment of climate change impacts and Adaptation to climate change

Number and types of fellows supervised in past 5 years : 3

b-

Name : Daouda BADIANE

Title : Responsable de formation Doctorale LPAO-SF, Université Cheikh Anta DIOP

Highest degree : PhD in Atmospheric Science of Université Cheikh Anta Diop de Dakar

Areas of expertise : Climate Sciences, drought.  
Number and types of fellows supervised in past 5 years : 1

c-

Name : Saidou Moustapha SALL  
Title : Responsable de formation Doctorale LPAO-SF, Université Cheikh Anta DIOP  
Highest degree : PhD in Atmospheric Science of Université Cheikh Anta Diop de Dakar  
Areas of expertise : Climate Science, rainfall  
Number and types of fellows supervised in past 5 years : 1

d-

Name : Alioune KANE  
Title : Director of the Doctorate School Water and Quality (EDEQUE), Université Cheikh Anta DIOP  
Highest degree : PhD in Geography and Hydrology of Université Cheikh Anta Diop de Dakar  
Areas of expertise : Water Resources.  
Number and types of fellows supervised in past 5 years : 3.

e-

Name : Isabelle NIANG  
Title : Head of Research Group, Associate Prof  
Highest degree : PhD in Geology Science of Université Cheikh Anta Diop de Dakar  
Areas of expertise : Costal Erosion and Climate Change impacts Assesment.  
Number and types of fellows supervised in past 5 years : 1

f-

Name : Jacques-André Ndione  
Title : Dr, Research Scientist  
Highest degree : PhD in Geography  
Areas of expertise : climate and health  
Number and types of fellows supervised in past 5 years : 0

g-

Name : Fadel KEBE  
Title : Dr, Research Scientist  
Highest degree : PhD in Atmospheric Physics  
Areas of expertise : climate and health, remote sensing of atmosphere  
Number and types of fellows supervised in past 5 years : 0

### **Interest in Applicant Review**

Yes, we are interested to participate in the applicants proposals review.