Report by Michel Jambu (April 2015)

1. **Iraq**

   My first visit was in November 2000, the Cultural Counsellor of the French Embassy in Iraq asked to CIMPA to promote mathematics in Iraq. I organized a ten days mission with M. Waldschmidt, D. Robert and G. Oppenheim. We visited the universities in Bagdad and Mossol.It was the starting point of a cooperation. One significent example is given by Fatima Aboud who came to Nantes few years later and she got a PhD under the supervision of D. Robert. She returned to the university of Dialat where she plays an important role in the mathematical community in Iraq.

   My second visit was in 2002 where I gave several talks in Bagdad and Mossol. Following this visit, I invited in 2003 to Nice, Ali Altaia who got his PhD in France twenty years before, and who is professor at Mustansyria university. I gave him several subjects of thesis for his students and two of them, Raad Salih Mahdi and Hana, teachers at Basrah University, got their PhD under his supervision; Raad Salih Mahdi came to Nice during the preparation of his thesis, Hana came to Nice after she got their PhD. Both of them are now professor at university of Basrah.

   Then Ali Altaia was deputy minister at the Ministry of Higher Education in Bagdad. He invited me to join the Conference in Al Qadisiya in 2011, and to visit the universities of Bagdad where I delivered several lectures.

   In 2012, he invited me again to attend another Conference in Iraq and I visited the university of Basrah.

   Hana and Raad organized a Conference in Basrah in 2013 and they invited me.

2. **Kurdistan**

   With the help of the French Embassy in Iraq and the French Consulate in Erbil, Michel Waldschmidt organized in 2009 the first Iraki-French Conference in Mathematics in Erbil. About ten French mathematicians were invited and it was my first visit to Kurdistan. More than one hundred mathematicians coming mainly from Iraq but also from Iran, attended this Conference.

   Then, I visited Kurdistan every year, either to give some talks and seminars at the universities of Salahaddin in Erbil, of Suleymania, of Duhoc and Zahko or as expert to select the Kurdish candidates to scholarships of the Ministry of Education of Kurdistan.

   I have tried to help a group of mathematicians from Duhoc and Zahko

working on topology, to go from abstract questions to applied topics in computational topology and geometry.
Michel Waldschmidt with Herish Omer from Salahaddin university, organized a program in mathematics on the French model of the *École Normale Supérieure*.
This program, which is not yet officially adopted by the university, benefits from the help of the French Embassy, of IMU-CDC through the Volunteer Lecturer Program, and of Salahaddin university. I was invited to give a Master course from March 24 to April 24, in 2014. The title of my course was *Introduction to plane algebraic curves*. Only four students attended my lectures and, unfortunaltely they did not have the basic background for this course, so I taught linear algebra and geometry.

3. **Mongolia**
In 2013, CIMPA organized two schools for the first time in Mongolia and I was one of the organizers and lecturers of the second school[1]. The head of the department of mathematics of the National University of Mongolia (NUM) invited me to organize a seminar at NUM in September 2014. The first 3 days of my visit was jointly with Herb Clemens (CDC-IMU) (August 2014).
In September 2015, Michel Waldschmidt and Francesco Papalardi will go to NUM to give a seminar preliminary to a CIMPA school in 2017.

4. **Cambodia**
The global challenge

A great challenge yet also a great opportunity for higher education in the 'developed" world is to contribute effectively to fundamental sciences in developing countries, where the need is large and increasing, but resources are lacking. Knowledge continues to replace physical capital as the source of national and regional wealth and this change is expected to accelerate in the future. As knowledge grows in importance, so does the need for higher education. Yet the gap between industrialized and developing countries continues to increase. Mathematics, both school mathematics and university mathematics, forms the basis on which scientific and technological advancement are built. The international institutions currently working to advance mathematics and teaching in the developing world are several European agencies:

[1]http://www.cimpa-icpam.org/ecoles-de-recherche/previous-programmes/2013-research-schools/list-of-2013-research-schools-by/article/fonctions-hypergeometriques-et

(a) ICTP (International Centre for Theoretical Physics), Italy,

(b) ISP (International Science Program), Sweden,

(c) CIMPA (Centre International de Mathématiques Pures et Appliquées), France,
As well as the IMU (International Mathematical Union), ICMI (International Council for Mathematics Instruction), EMS (European Mathematical Society).

Mathematics in Cambodia

A compelling reason to focus on Cambodia is the appalling destruction of the education system in that country, due mainly to the terrible civil war in 1970' and 1980'. In public secondary schools, there are more than 100 pupils in each classroom. The salaries of the professors are so low that they need to have at least one other job to survive, sometimes more. In those conditions, one cannot expect to attract young bright people into education. Moreover, many private institutions are appearing, especially in Phnom Penh, and these offer somewhat better conditions which further erodes the teacher pool in public education. Another factor is that many of the young people who do achieve an education are attracted into business where they expect far greater returns. Careers in mathematics and more generally fundamental sciences, even as a university professor, are not attractive. For example, the highest salary for a professor at the university is about 400 USD per month although the minimum required to live in Phnom Penh is 700 USD and is increasing everyday. Almost all the professors at the university have only a Bsc. Between 1980 and 2000, only three Cambodian nationals were awarded a PhD degree in mathematics.

CIMPA as pioneer

See the presentation to SEAMaN, June 2015.