

MIFIMA  
Mathematics, Informatics  
and Fisheries Management  
*STIC-AmSud*  
October 2006–October 2009  
(Domain: Mathematics, Informatics)

Michel DE LARA,  
CERMICS, École des Ponts ParisTech, France

November 5, 2008

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  - ▶ Peru
  - ▶ Chile
  - ▶ France
- ▶ Three disciplines
  - ▶ Ecology (Biology, Resources Management)
  - ▶ Economy (Environmental Economics)
  - ▶ Mathematics (Control Theory)
- ▶ Three years
  - ▶ October 2006 – October 2009

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	Institutions	Responsibles
France	École des Ponts ParisTech	Michel DE LARA
Chile	Univ. Alberto Hurtado	Julio PEÑA-TORRES
Peru	IMCA	Eladio OCAÑA

- ▶ Eladio Ocaña, **Instituto de Matemática y Ciencias Afines (IMCA)**, Lima
- ▶ Elsa Galarza, CIUP Centro de Investigacion de la **Universidad del Pacifico**, Lima
- ▶ Wilfredo Sosa, **IMCA**, Lima
- ▶ Jorge Tam, **Instituto del Mar del Perú (IMARPE)**, Centro de Investigaciones en Modelado Oceanográfico y Biológico Pesquero (CIMOBP)
- ▶ Ricardo Oliveros-Ramos, **IMARPE/CIMOBP**

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# Chilean Team

- ▶ Julio Peña-Torres, Facultad de Economía y Negocios, Universidad Alberto Hurtado, Santiago
- ▶ Pedro Gajardo, Departamento de Matemática, Universidad Técnica Federico Santa María, Valparaíso and CMM
- ▶ Hector Ramirez, Departamento de Ingeniería Matemática, Universidad de Chile, Santiago and CMM
- ▶ Alejandro Zuleta, Centro de Estudios Pesqueros (CEPES), Santiago
- ▶ Pedro Rubilar, CEPES, Santiago
- ▶ Patricio Barria, Instituto de Fomento Pesquero (IFOP), Valparaíso
- ▶ Adriana Piazza, Centro de Modelamiento Matemático (CMM), Universidad de Chile, Santiago

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- ▶ Michel De Lara, CERMICS, École des Ponts ParisTech
- ▶ Pierre Cartigny, UMR Analyse des Systèmes et Biométrie, INRA, Montpellier
- ▶ Vincent Martinet, UMR Économie publique, INRA, Grignon
- ▶ Pascal Neveu, UMR Analyse des Systèmes et Biométrie, INRA, Montpellier
- ▶ Jean-Christophe Pereau, laboratoire Organisation et efficacité de la production, Université Marne la Vallée
- ▶ Luc Doyen, UMR Conservation des espèces, restauration et suivi des populations (CERESP), museum National d'Histoire Naturelle

# French fundings

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## French Ministry of Foreign Affairs

Received (2006-2007)	Spent (2006-2007)
14 200 euros	12 746,84 euros
Received (2007-2008)	Spent (2007-2008)
7 000 euros	5 700 euros
Sollicitated (2008-2009)	10 000 euros

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NRIA

Received (2006-2007)	Spent (2006-2007)
5 000 euros	6 195,44 euros
Received (2007-2008)	Spent (2007-2008)
10 000 euros	7 200 euros
Sollicitated (2008-2009)	10 000 euros

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- ▶ 2007, January 19-20 / Workshop / IFOP, Valparaiso, Chile
- ▶ 2007, January 22-23 / Workshop / CMM, Santiago de Chile
- ▶ 2007, October 5-6 / Workshop / IMCA, Lima, Peru
- ▶ 2008, June 12-13 / Workshop / ENPC, Paris, France
- ▶ 2008, June 18-20 / Workshop / INRA, Montpellier, France
- ▶ 2008, September 9-12 / Cluster MIFIMA within CLAIO 2008 / Cartagena de Indias, Colombia

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# Courses 2006-2007

- ▶ 2006, November 20-23 / **IMCA**, Lima, Peru  
Michel De Lara:  
**Matemática e Informática para la gestión sostenible de recursos naturales**
- ▶ 2007, August 7-18 /  
**Universidad del Pacifico**, Lima, Peru  
Michel De Lara:  
**Matemática e Informática para el Manejo Sustentable de Recursos Naturales**
- ▶ 2007, September 24-October 8 /  
**IMCA**, Lima, Peru  
Pierre Cartigny and Pascal Neveu:  
**Modelling for the Management of Halieutic Resources**

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- ▶ 2008, August 4-13 /  
**IMARPE**, Callao, Peru  
Elsa Galarza and Michel De Lara:  
**Metodos Cuantitativos para el Manejo Sustentable de Recursos Oceanicos**
- ▶ 2008, September 15-26 and November 10-21 /  
**IMCA**, Lima, Peru  
Pierre Cartigny:  
**Modelling for the Management of Halieutic Resources.**

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# Research and student missions

## ▶ Research

- ▶ France → Chile and France → Peru: 1 to 3 weeks missions
- ▶ Chile → France: 2 to 3 weeks missions
- ▶ Peru → France: 3 months missions
- ▶ Peru → Chile and Chile → Peru: no mission

## ▶ Students

- ▶ Three engineers students (ENSTA ParisTech)
- ▶ Three months stays in CMM, Chile (including one month in IMCA for one of them)

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## Joint publications (accepted or submitted)

- ▶ E. Ocaña, P. Cartigny, **Singular infinite horizon calculus of variations Applications to fisheries management**, accepted for publication in "Recent advances in infinite horizon optimal control" (Alexander Zaslavski editor)
- ▶ E. Ocaña, M. De Lara, R. Oliveros-Ramos, J. Tam, **Sustainable Quotas and Viable Management of Ecosystems**, submitted to Journal of Mathematical Biology
- ▶ M. De Lara, V. Martinet, **Multi-criteria dynamic decision under uncertainty : a stochastic viability analysis and an application to sustainable fishery management**, Revision, Mathematical Biosciences
- ▶ J. Peña-Torres, M. Valderrama, **Localización del Esfuerzo de Pesca en la Pesquería Chileno-Transzonal del Jurel**, submitted to Trimestre Económico

# Joint publications (drafts)

- ▶ P. Gajardo, J. Peña-Torres, H. Ramirez,  
Harvesting Technology and the Risk of Fishing Collapse:  
the case of Pelagic Fish
- ▶ J.L. Malverde, P. Gajardo, J. Peña-Torres, H. Ramirez,  
Transboundary Fish Stocks and Strategic Interactions  
between Competing Fleets
- ▶ J. Peña-Torres, M. Valderrama,  
Fishing Location in the Chilean-transzonal Jack  
mackerel fishery

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# Joint publications (drafts)

- ▶ M. De Lara, P. Gajardo, H. Ramirez,  
Viable harvest of monotone bioeconomics models:  
preservation and production issues
- ▶ M. De Lara, P. Gajardo, H. Ramirez, A. Zuleta, P.  
Rubilar,  
Análisis de viabilidad para pesquerías de profundidad:  
aplicación a las pesquerías del Alfonsino y Bacalo en  
Chile
- ▶ V. Martinet, J. Peña-Torres, H. Ramirez, P. Gajardo,  
M. De Lara,  
Stochastic viability modelling for the Chilean Jack  
Mackerel industrial fishery
- ▶ R. Oliveros-Ramos, J. Tam, M. De Lara,  
Viable control model for management of fisheries: the  
case of Peruvian Hake *Merluccius gayi peruanus*

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# Students reports

- ▶ Joël Trigalo, **ENSTA ParisTech**, 2007.  
(H. Ramirez, P. Gajardo, M. De Lara)
- ▶ Nicolas Chaulet, **ENSTA ParisTech**, 2008.  
(H. Ramirez, P. Gajardo)
- ▶ Claire Nicolas, **ENSTA ParisTech**, 2008.  
(J. Peña-Torres, H. Ramirez, P. Gajardo)
- ▶ Jose Luis Malverde, Memoria de Ingeniería Matemática **Univesidad de Chile**, 2008.  
(H. Ramirez, J. Peña-Torres)
- ▶ G. Fernandez, tesis de Master para optar al grado de M.A. in Economics, Programa **Georgetown University/ILADES-UAH**, 2008.  
(J. Peña-Torres)

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# Project submission process

## ▶ Different instructions.

The files that had to be filled by each country were not the same for each country, and some instructions were different

## ▶ Who pays what?

We filled the fundings demand under the hypothesis that each country had to pay for the stay of a foreign visitor. Later, we were told that each country would pay only for its 'nationals'

## ▶ Predicting missions three years in advance!

Missions were to be given with high level of detail – person, dates, motives – three years in advance! This is meaningless for a research program

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## ▶ Predicting missions three years in advance!

Missions were to be given with high level of detail – person, dates, motives – three years in advance! This is meaningless for a research program

- ▶ Funding is very different and very variable from year to year, depending on the country
  - ▶ 2007 : French funding was conform to demand
  - ▶ 2008 : French funding was much less than demand, but INRIA increased its funding
  - ▶ 2009 ?
- ▶ Money has to be spent during the year: this is not practical.  
However, the Ecole des Ponts budget is flexible enough to compensate for this rigidity.

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# Light administrative tasks: thank you!

- ▶ Each country maintains a webpage of MIFIMA
  - ▶ French website
  - ▶ Chilean website
  - ▶ Peruvian website
- ▶ The French webpage includes all of MIFIMA “life”
  - ▶ Agenda of scientific activities
  - ▶ General description of the scientific project
  - ▶ Administrative and scientific management
- ▶ The pdf version of the MIFIMA webpage has, it seems, been taken as annual report.  
This is very practical :-)

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# What we have achieved so far

- ▶ Very **flexible organization**
- ▶ Very **good motivation** of Chilean, Peruvian and French partners to organize joint workshops, to write papers, etc.
- ▶ **Inclusion of new partners:** Peruvian biologists from IMARPE
- ▶ **Integration within countries**
  - ▶ **Peru:** course given at IMARPE by economist Elsa Galarza
  - ▶ **Chile:** cooperation under the impulsion of CMM
    - ▶ symposium at IFOP (never done before)
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- ▶ **Submission of papers**
- ▶ **Course proposals**
- ▶ **Students supervision** (two from Polytechnique in 2009?)
- ▶ **Final MIFIMA meeting**, october-december 2009, Lima, Peru
  - ▶ **Restitution workshop**
  - ▶ **Course** on management quantitative methods

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