



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

19208

11 P.

# REPORT ON ICS TRAINING COURSE

## MODELS AND DATA ANALYSIS FOR VEGETATION CLIMATE INTERACTIONS

HELD AT THE NATIONAL LABORATORY OF QUANTITATIVE  
VEGETATION ECOLOGY, BEIJING, CHINA, OCTOBER 4-14, 1991

6

## **REPORT ON ICS TRAINING COURSE**

### **MODELS AND DATA ANALYSIS FOR VEGETATION CLIMATE INTERACTIONS**

**HELD AT THE NATIONAL LABORATORY OF QUANTITATIVE  
VEGETATION ECOLOGY, BEIJING, CHINA, OCTOBER 4-14, 1991**

The National Laboratory of Quantitative Vegetation Ecology (NLQVE) held a 10 days Workshop in Beijing, China funded by ICS, UNIDO. The purpose of the workshop was to train participants for the fundamental and advanced topics on models and data analysis methods regarding vegetation and climate interaction and collaborate them for the vegetation climate interaction project. A total of 36 participants from 6 countries took part in the workshop.

The host institute was represented by Prof. D.H.S. Chang (Director of Institute of Botany, CAS and Head of NLQVE) and Prof. Q. Gao (Deputy Head of NLQVE). Prof. E. Feoli (Univ. of Trieste and Deputy co-ordinator of IEM) served as the co-Chairman of the workshop.

The course consisted of 27 hours lecture, 20.5 hours computer practise and model exercise and one day plenary session. The formal opening of the Workshop included addresses from Prof. D.H.S. Chang and the introduction of ICS, UNIDO and IEM by Prof. E. Feoli.

The workshop was divided into two parts, data analysis and modelling. All lectures followed by a question period and discussions. Associated with the lectures, computer and modelling practises were arranged in every afternoon. In the plenary session, all the participants have given the opportunity to show their research interests and to bring in the related local ecological problems.

The lectures covered wide range of modelling and data analysis methods. These included not only the classical sampling theory, classification and ordination methods, but also modern fuzzy theory, spatial pattern analysis and response model in community study. A series of lectures on nature and steps of mathematical modelling fresh the participants why and how to build a model. The computer practice provided participants hand-on experience of using advanced data analysis computer software including SYNTAX IV created at IEM by Dr. J. Podani

in 1990. All participants showed great interest in the model building exercises and all of them appreciated very much for Prof. D.W. Goodall's tireless teaching and assistance. The plenary session exposed all participants to the theoretical and applying problem of using data analysis methods and made suggestions for the existed ecological problem arosed from the participants, e.g. deforestation in southern China and desertification in western China.

Special attention has been given to Prof. D.H.S. Chang's lecture on the introduction of ecological information system (EIS) which created at NLQVE. Great amount information, advanced support system and potential power for the global change project have impressed all the participants very much.

The workshop ended with the forming of a new Chinese working group affiliated to IIEM, ICS, UNIDO project of "Modelling Climate Vegetation Interaction in Tropical and Subtropical Regions" and with get together dinner by the Chinese food made by all the participants.

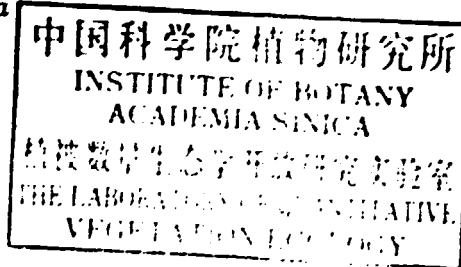
Beijing Oct. 17, 1991

*Q. Gao*

Q. Gao  
Contractor  
NLQVE  
Institute of Botany  
Academia Sinica  
Beijing, China

*D.H.S. Chang*

D.H.S. Chang  
Chairman of the Workshop  
Director  
NLQVE  
Institute of Botany  
Academia Sinica  
Beijing, China



# LIST OF ALL PARTICIPANTS

<i>E. FEOLI</i>	<i>LECTURER</i>	<i>PROF.</i>	<i>DEPARTMENT OF BIOLOGY, UNIVERSITY OF TRIESTE, ITALY</i>
<i>D.W. GOODALL</i>	<i>LECTURER</i>	<i>PROF.</i>	<i>C.S.I.R.O. DIV. WILDLIFE AND RANGELANDS RESEARCH, AUSTRALIA</i>
<i>N.C. KENKEL</i>	<i>LECTURER</i>	<i>ASSO. PROF.</i>	<i>DEPARTMENT OF BOTANY, UNIVERSITY OF MANITOBA, WINNIPEG, MANITOBA, R3T 2N2, CANADA</i>
<i>L. ORLOCI</i>	<i>LECTURER</i>	<i>PROF.</i>	<i>DEPARTMENT OF PLANT SCIENCES, THE UNIVERSITY OF WESTERN ONTARIO, LONDON, CANADA, N6A 5B7</i>
<i>J. PODANI</i>	<i>LECTURER</i>	<i>Dr.</i>	<i>DEPARTMENT OF PLANT TAXONOMY AND ECOLOGY, ETH HUN BELATER 2, H-1083 BUDAPEST, HUNGARY</i>
<i>O. WILDI</i>	<i>LECTURER</i>	<i>PROF.</i>	<i>SWISS FEDERAL INSTITUTE OF FOREST, SNOW AND LANDSCAPE RESEARCH, LANDSCAPE DEPT. CH-8903, BIRMENSdorf, SWITZERLAND.</i>
<i>D.H.S. CHANG</i>	<i>LECTURER</i>	<i>PROF.</i>	<i>NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA</i>
<i>Q. GAO</i>	<i>LECTURER</i>	<i>ASSO. PROF.</i>	<i>NLQVE, INSITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA.</i>
<i>C.Y. SUN</i>	<i>LECTURER</i>	<i>ASSISTANT PROF.</i>	<i>NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA. (CURRENTLY WORKING AT ILEM)</i>
<i>GUISEN CHEN</i>	<i>PARTICIPANT</i>	<i>ASSISTANT PROF.</i>	<i>INSTITUTE OF NORTHWEST PLETEAU, ACADEMIA SINICA, XINING, CHINA</i>
<i>MING PENG</i>	<i>PARTICIPANT</i>	<i>ASSISTANT PROF.</i>	<i>INSTITUTE OF NORTHWEST PLETEAU, ACADEMIA SINICA, XINING, CHINA</i>
<i>GUIHUA YANG</i>	<i>PARTICIPANT</i>	<i>ASSISTANT PROF.</i>	<i>INSTITUTE OF ECOLOGY, YUNNAN UNIVERSITY, KUNMING, CHINA</i>
<i>SHUQING AN</i>	<i>PARTICIPANT</i>	<i>ASSISTANT PROF.</i>	<i>DEPARTMENT OF BIOLOGY, NANJING UNIVERSITY, NANJING, CHINA</i>
<i>HONGPING PEI</i>	<i>PARTICIPANT</i>	<i>ASSISTANT PROF.</i>	<i>DEPARTMENT OF BIOLOGY, HANGZHOU UNIVERSITY, HANGZHOU, CHINA</i>

XIAOSHUANG HE	PARTICIPANT	ASSISTANT PROF.	INSTITUTE OF BOTANY, UNIVERSITY OF NORTHEAST FORESTRY, HARBIN, CHINA
CHENG SHAO	PARTICIPANT	ASSISTANT PROF.	INSTITUTE OF ECOLOGY, LIAONING UNIVERSITY, SHENYAN, CHINA
XIAOYUN LIU	PARTICIPANT	ASSISTANT PROF.	BIOLOGICAL AND SOIL INSTITUTE, ACADEMIA SINICA, XINJIANG, CHINA
JINGXUAN HAN	PARTICIPANT	ASSISTANT PROF.	COMMISSION FOR INTEGRATED SURVEY OF NATURAL RESOURCES, ACADEMIA SINICA, BEIJING, CHINA
YANGBIN AO	PARTICIPANT	POST DOCTOR	INSTITUTE OF ATMOSPHERE, ACADEMIA SINICA, BEIJING, CHINA
XIHUA WANG	PARTICIPANT	ASSISTANT PROF.	DEPARTMENT OF ENVIRONMENT, HUA DONG FORMAL COLLEGE, SHANGHAI, CHINA
HUI LI	PARTICIPANT	GRADUATE STUDENT	PLETEAU BIOLOGICAL INSTITUTE, TIBET, CHINA
PEIHAO PENG	PARTICIPANT	GRADUATE STUDENT	PLETEAU BIOLOGICLA INSTITUTE, TIBET, CHINA
DIANAN YANG	PARTICIPANT	ASSO. PROF.	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
XIA LI	PARTICIPANT	RESEARCH ASSISTANT	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
NING LIANG	PARTICIPANT	RESEARCH ASSISTANT	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
DAIYUAN PAN	PARTICIPANT	ASSISTANT PROF.	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
LEI DA	PARTICIPANT	RESEARCH ASSISTANT	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
ZHAOYANG YANG	PARTICIPANT	GRADUATE STUDENT	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA

XUEJUN DONG	PARTICIPANT ASSISTANT PROF.	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
HAISHENG XIE	PARTICIPANT POST DOCTOR	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
KE GUO	PARTICIPANT ASSISTANT PROF.	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
CHENJUN YIN	PARTICIPANT RESEARCH ASSISTANT	ECOLOGICAL CENTER, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
JINYANG XIE	PARTICIPANT PH.D STUDENT	ECOLOGICAL CENTER, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
WENGE NI	PARTICIPANT RESEARCH ASSISTANT	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
WENHONG MO	PARTICIPANT GRADUATE STUDENT	ECOLOGICAL CENTER, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA
JINZHENG CHEN	PARTICIPANT ASSO. PROF.	NLQVE, INSTITUTE OF BOTANY, ACADEMIA SINICA, BEIJING, CHINA



**THE TIME TABLE OF THE ICS TRAINING COURSE ON  
VEGETATION CLIMATE INTERACTION  
NLQVE, OCT. 4-14, 1991, BEIJING, CHINA**

<i>DATE</i>	<i>CHAIRMAN</i>	<i>TIME</i>	<i>ACTIVITY</i>	<i>SPEAKER(S)</i>
<i>OCT. 4</i>	<i>D.H.S. CHANG</i>	<i>9:00</i>	<i>OPENING CEREMONY</i>	<i>D.H.S. CHANG</i>
<i>FRIDAY</i>		<i>9:15</i>	<i>INTRODUCTION TO. ICS</i>	<i>E.FEOLI</i>
		<i>9:45</i>	<i>INTRODUCTIONB TO THE VEGETATION CLIMATE INTERACTION</i>	<i>D.H.S. CHANG</i>
		<i>10:45</i>	<i>BREAK</i>	
		<i>11:00</i>	<i>CLIMATE VEGETATION INTERACTION --THEORETICAL BASICS AND TECHNICAL PROBLEMS</i>	<i>L. ORLOCI</i>
		<i>12:00</i>	<i>LUNCH</i>	
		<i>13:30</i>	<i>INTENSITY AND SCALE OF SPATIAL PATTERNS</i>	<i>N. KENKEL</i>
		<i>14:30</i>	<i>SIMULATING SPATIAL PATTERNS</i>	<i>O.WILDI</i>
		<i>15:30</i>	<i>BREAK</i>	
		<i>15:45</i>	<i>COMPUTER DEMONSTRATION - INTRODUCTION TO THE WORKING ENVIRONMENT AT NLQVE</i>	<i>L. DAI</i>
		<i>17:00</i>	<i>END</i>	
<i>OCT. 5</i>	<i>D.W. GOODALL</i>	<i>8:45</i>	<i>CLIMATE VEGETATION INTERACTION - INTRODUCTION TO ECOLOGICAL INFORMATION SYSTEM (EIS)</i>	<i>D.H.S. CHANG</i>
		<i>9:45</i>	<i>BREAK</i>	
		<i>10:00</i>	<i>SAMPLING THEORY</i>	<i>J. PODANI</i>
		<i>11:00</i>	<i>SAMPLING AND COMMUNITY DESCRIPTION (1)</i>	<i>L. ORLOCI</i>
		<i>12:00</i>	<i>LUNCH</i>	
		<i>13:30</i>	<i>RESPONSE MODELS AND ORDINATION TECHNIQUES</i>	<i>E. FEOLI</i>
		<i>14:30</i>	<i>ORDINATION METHODS: DIRECT AND INDIRECT GRADIENT ANALYSIS (1)</i>	<i>N. KENKEL</i>
		<i>15:30</i>	<i>BREAK</i>	
		<i>15:45</i>	<i>COMPUTER DEMONSTRATION MULVA (1)</i>	<i>O.WILDI</i>
		<i>17:00</i>	<i>END</i>	

OCT. 7 L. ORLOCI 8:45 ORDINATION METHODS: DIRECT AND INDIRECT N. KENKEL  
GRADIENT ANALYSIS (2)

9:45 BREAK

10:00 SAMPLING AND COMMUNITY DESCRIPTION(2) L. ORLOCI

11:00 CLUSTER ANALYSIS (1) J. PODANI

12:00 LUNCH

13:30 CLUSTER ANALYSIS (2) J. PODANI

14:30 FUZZY THEORY AND APPLICATION E. FEOLI

15:30 BREAK

15:45 COMPUTER DEMONSTRATION SYNTAX IV J. PODANI

17:00 END

OCT 8. C.Y. SUN 8:45 BIOENVIRONMENTAL ANALYSIS L. ORLOCI

9:45 BREAK

10:00 CLIMATIC DATA ANALYSIS C.Y. SUN

11:00 CLUSTER ANALYSIS (3) Q. GAO

12:00 LUNCH

13:30 MULTISPECIES PATTERN ANALYSIS J. PODANI

14:30 THE ROLE OF SPATIAL AUTOCORRELATION O. WILDI

15:30 BREAK

15:45 COMPUTER DEMONSTRATION MULVA (2) O. WILDI

17:00 END

OCT. 9	E. FEOLI	8:45	THE NATURE AND STEPS OF MATHEMATICAL MODELLING (1)	D.W. GOODALL
		9:45	BREAK	
		10:00	VEGETATION SIMULATION ANALYSIS IN SWITZERLAND (1)	O. WILDI
		11:00	VEGETATION SIMULATION ANALYSIS IN SWITZERLAND (2)	O. WILDI
		12:00	LUNCH	
		13:30	COMPUTER PRACTISE OF USING SYNTAX IV BY THE REAL DATA FROM PARTICIPANTS AND DISCUSSION OF METHODOLOGIES IN ECOLOGICAL ANALYSIS	
		17:00	END	
OCT. 10	Q. GAO	8:45	THE NATURE AND STEPS OF MATHEMATICAL MODELLING (2)	D.W. GOODALL
		9:45	BREAK	
		10:00	MODELLING OF CO <sub>2</sub> ABSORPTION	E. FEOLI
		11:00	COMPUTER DEMONSTRATION OF A PROGRAM FOR PLANT GROWTH MODEL	E. FEOLI
		12:00	LUNCH	
		13:30	MODELLING EXERCISES	D.W. GOODALL
		17:00	END	

OCT. 11	N. KENKEL	8 : 45	SUCCESSION APPROXIMATION	LORLOCI
		9 : 45	BREAK	
		10 : 00	CONSENSUS BETWEEN ORDINATION	J. PODANI
		11 : 00	MODELLING EXERCISES	D.W. GOODALL
		12 : 00	LUNCH	
		13 : 30	APPLICATION OF MULVA-4 TO DIFFERENT SIMULATED COMMUNITY DISTRIBUTION	O. WILDI
		14 : 30	COMPUTER DEMONSTRATION (1) FUZZY PACKAGE (2) GDMOD	Q. GAO
		17 : 00	END	
OCT. 12	L. ORLOCI	9 : 00	PLENARY SESSION (1) APPLICABILITY OF MODELLING IN ECOLOGICAL MANAGEMENT OF CHINA (2) POSSIBLE ASSESSEMENT OF CLIMATIC CHANGE AFFECTING THE VEGETATION	
		12 : 00	LUNCH	
		13 : 30	PLENARY SESSION CONTINUATION OF THE MORNING TOPIC	
OCT. 14	D.H.S. CHANG	9 : 00	CLOSING CEREMONY FORMING A CHINESE WORKING GROUP AFFILIATED TO ILEM, ICS PROJECT	