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<sup>1</sup> All acronyms, whether explained or not in the text, can be found in the appendices.

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## Preface

*“Τῆς τοῦ φιλοσόφου πραγματείας εἶναι νομίζομεν, εἵπερ ἄλλην τινά, καὶ τὴν γεωγραφικὴν, ἣν νῦν προηγήμεθα ἐπισκοπεῖν. Ὅτι δ’ οὐ φαύλως νομίζομεν, ἐκ πολλῶν δῆλον. Οἱ τε γὰρ πρῶτοι θαρρήσαντες αὐτῆς ἄψασθαι τοιοῦτοί τινες ὑπῆρξαν· Ὀμηρός τε καὶ Ἀναξίμανδρος ὁ Μιλήσιος καὶ Ἐκαταῖος, ὁ πολίτης αὐτοῦ, καθὼς καὶ Ἐρατοσθένης φησί· καὶ Δημόκριτος δὲ καὶ εὐδοξος καὶ Δικαίαρχος καὶ Ἐφορος καὶ ἄλλοι πλείους· ἔτι δὲ οἱ μετὰ τούτους, Ἐρατοσθένης τε καὶ Πολύβιος καὶ Ποσειδώνιος, ἄνδρες φιλόσοφοι. Ἡ τε πολυμάθεια, δι’ ἧς μόνης ἐφικέσθαι τοῦδε τοῦ ἔργου δυνατὸν, οὐκ ἄλλον τινὸς ἐστίν, ἢ τοῦ τὰ θεῖα καὶ τὰ ἀνθρώπεια ἐπιβλέποντος, ὧν περ τὴν φιλοσοφίαν ἐπιστήμην φασίν. Ὡς δ’ αὐτῶς καὶ ἡ ὠφέλεια ποικίλη τις οὔσα, ἡ μὲν πρὸς τὰ πολιτικὰ καὶ τὰς ἡγεμονικὰς πράξεις, ἡ δὲ πρὸς ἐπιστήμην τῶν τε οὐρανίων καὶ τῶν ἐπὶ γῆς καὶ θαλάττης ζώων καὶ φυτῶν καὶ καρπῶν καὶ τῶν ἄλλων, ὅσα ἰδεῖν παρ’ ἐκάστοις ἔστι, τὸν αὐτὸν ὑπογράφει ἄνδρα, τὸν φροντίζοντα τῆς περὶ τὸν βίον τέχνης καὶ εὐδαιμονίας”*

STRABO (63 B.C.- 24 A.D. ?) Geography, Book I Chapter 1 §1

One can wonder how a geographer with an original specialisation in climatology ended up working in the field of decision-making. It all started by the will to acquire some technical competencies in what was seen as tomorrow's tools namely geographic information systems (GIS) and remotely sensed image processing. After one year, following classes and working as stagiaire on some projects at the International Institute for Aerospace Survey and Earth Sciences (ITC) in Enschede, the Netherlands, the opportunity to work as researcher at the Service Universitaire de Recherches Fondamentales et Appliquées en Cartographie et Études Spatiales (SURFACES) of the Université de Liège, Belgium, came up with the possibility to apply for a full-time Assistant position for the following academic year, meaning starting a doctoral investigation. In the mean time, short contracts were provided for expertise in cartography, GIS and remote sensing. At the time of starting the doctoral research, only a part-time position was made available. So, for the next two years, contracts had to be found. Most of them turned out to be one or two month(s) long. This can partially explain why it took one year to identify a theme of investigation.

In the meetings organised with the purpose of defining the subject of the doctoral research, several propositions were made involving the use of GIS for climate studies – which was still unusual at the time. For legitimacy reasons and because they seemed too applied for him, my promoter rejected them all until we thought of the decision-making field and agreed on *“errors and uncertainties in spatial decision support systems”* as research theme with the possibility to illustrate the concepts with a climatological case. On the one hand, it corresponded to a niche in which nobody was researching at the Université de Liège<sup>2</sup> and which was in the move of the geographic information community (see further). On the other hand, within climatologists, there was a big concern on how the decision-makers were taking decisions when facing climate issues. This concern had been expressed and discussed at the 14<sup>th</sup> international congress of biometeorology held in Ljubljana, Slovenia, by the study group 13 in charge of climate perception and decision making, in which scientists involved in the preparation of the Kyoto protocol were participating.

Once the theme was known, the study of the field was initiated by following a few courses offered by the Faculty of Economics and Management, namely decision support (*“Aide à la décision”*), system programming (*“Programmation système”*) and management information system (*“Système intelligent de management”*), and, later, one offered by the Department of Mathematics on environmental multi-criteria analysis (*“Analyse multicritère pour l’environnement”*). Other courses were taken outside of the Alma Mater to complement the education and broaden the research perspective. A two weeks long NATO Advanced Study Institute on *“Deposit and geoenvironmental models for resources exploitation and environmental security”* which took place in Mátraháza, Hungary, was followed by a one week course on *“Models in environmental research”* organised in Lauenburg, Germany, by GKSS and the Universität Hamburg. Several courses of the Ph.D. program on desertification of the Universitat de València in Valencia, Spain, were also taken namely on planning and integrated studies (*“Estudios integrados y planificación”*), on land evaluation (*“Evaluación de suelos”*) and on the evaluation and indicators of land degradation (*“Evaluación y indicadores de la desertificación”*). More recently, participation in the course on *“Strategic Environmental Assessment with focus on spatial planning, policies and the Århus convention”* organised in Søminen, Denmark, by the Institut for miljø, teknologi og samfund of the Roskilde Universitetscenter was made possible in the frame of the SUIT research project.

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<sup>2</sup> DENIS J., GOOSENS M. & PISSART A. (eds.) (1996) *Geographical research in Belgium*, Comité National de Géographie, [1<sup>st</sup> publication: (1995) Bulletin de la Société Belge d'Études Géographiques - Tijdschrift van de Belgische Vereniging voor Aardrijkskundige Studies, vol. 64 (2)], Leuven. F1.a.1.£ # 930.

Shorter training in the form of seminars were attended before symposiums like the ones on "*Imprecise probabilities*" at the 1<sup>st</sup> ISIPTA organised by Universiteit Gent in Gent, Belgium and on "*Uncertainty in geographical information*" at the ISSDQ organised by the Hong Kong Polytechnic University in Hong-Kong, China; or as evening classes like the introduction to the mathematical modelling of transports ("*Introduction à la modélisation mathématique des transports*") or like the one on decision ("*La décision*") organised respectively by the transport research group - GRT of the Department of Mathematics and by the laboratory of knowledge anthropology - humus, both of the Facultés Universitaires Notre-Dame de la Paix in Namur, Belgium.

In parallel, the search of a decisional issue identified the place of drought in decision making at different spatial scales as a relevant case. This case study was dependant on the establishment of a network linking scientists, industries, politicians, public and administrations interested in the drought problematic within Europe. Unfortunately, the European Network on Drought Research and Mitigation (ENDRM) initiative was aborted after a restructuring of the Space Applications Institute of the Joint Research Centre of the European Commission in Ispra, Italy. Nevertheless, according to the need expressed for such a research, the issue of drought was kept for illustration purposes (see chapter confrontation with 'reality'). This thematic was also the centre of interest and of a collaboration with the Faculté de Foresterie et de Géomatique at Université Laval in Quebec, Canada.

In that period, the doctoral education system of the Université de Liège was reforming and an accompanying comity has been established. The reforms formally recognised the presentation of thesis based on publications as already allowed *de facto* or in the regulation of certain doctoral schools. In the geography section, there has never been before such a thesis. Since the aim to have two publications per year was set at the time of signing the application for the Assistant position, the door was open for such a thesis. Besides those preoccupations, several consultant contracts were performed in order to have a minimum of resources to cover partially congress participation and exchange of ideas with other scientists. It should also be noted that this doctoral investigation was mainly performed after hours, during the very few spare times remaining once the different contractual activities were completed (refer to appendices for a complete list).

On an epistemological level, this research shares Strabo's vision of geography<sup>3</sup> rather than de Saint-Exupéry's, as it appears in 'Le petit prince'. Although coming from a technological background, this research aimed at serving both human needs and governing practices by integrating in a holistic approach a multiplicity of knowledge rather than working on the technology for itself. In other words, it can be seen as Don Quichote's attempt to convince his colleagues to get out of their Plato's cave.

I hope you will enjoy reading this work as much as I have enjoyed learning, confronting and sharing my ideas with others' within different fields and institutes.

Bernard CORNÉLIS

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<sup>3</sup> Translation : « Indeed, the geography we propose to study in this manuscript is a matter of philosophy, if ever it was a science. More than one facts allow us to think so. To start with, the first authors who dared to investigate this science were philosophers: Homer, then Anaximander of Milet and Hecate his fellow citizen as Eratosthenes recons it; then Democritus, Eudoxe, Dicearke, Ephore and many others with them; more recently Eratosthenes, Polybe, Posidonius, all of them philosophers. Secondly, the multiplicity of knowledge which is the only way to achieve such a work, can only be found in a man who is used to consider at the same time the divine and human things which is in itself the definition of philosophy. Finally, the variety of applications which derive from it in different fields serves both the needs of the public and of the governing practices; and aims at improving our knowledge of the celestial, earth and sea phenomenon including what they contain, living things, plants, fruits and also the distinctive features of each land. This variety requires the same kind of man, someone used to care for the art of living and of being happy. »