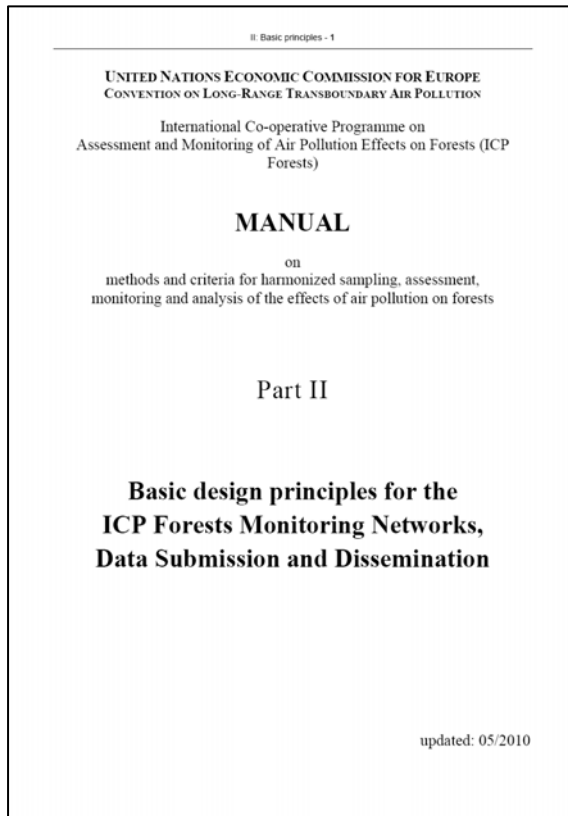
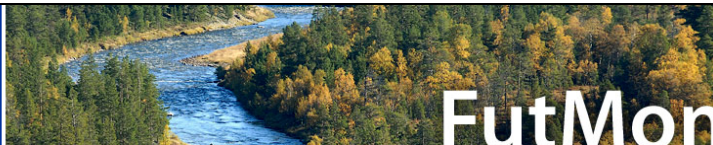


Action C1-QAC-15(IT) LIFE+ FutMon Project
[Contract n° LIFE07 ENV/D/000218]



Focus on: part II, Monitoring Design

Marco Ferretti
TerraData environmetrics
ferretti@terradata.it



Associated Beneficiary:
Ministero delle politiche agricole alimentari e forestali
Corpo Forestale dello Stato, Italy

Most important issues covered

- Design of Level I (with NFI and dataserie implications)
- Design of Level II
- Level II variables (see Fischer, next presentation)
- QA/QC (see Ferretti, next presentation)
- Citation
- Data Policy



“Post-hoc” design: difficult task

Need to consider:

- Different, well established, conceptual and operational perspectives
- National monitoring “traditions” and plot set-up
- Monitoring objectives

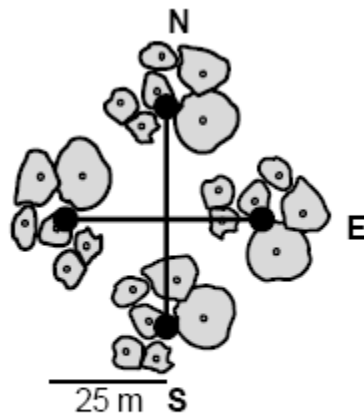


Level I design

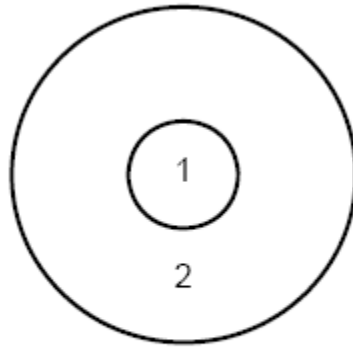
Subject	Areas of concern	Manual	Note
Level I	Plots, dimension and shape	Fixed area	suggestions for maintaining dataserie
	Minimum density	1 every 256 km ²	-
	Sampling scheme	Probabilistic	Integration with NFI
	Responsability	National level	Target statistical population needs to be the same at european level



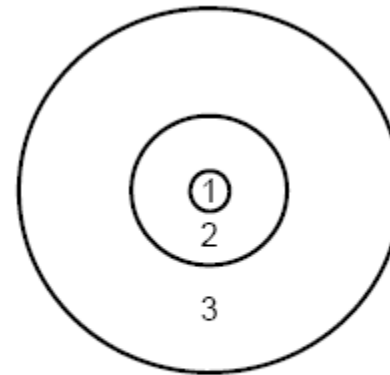
Level I plot design(s)



A. Cross-cluster sample,
undefined shape and area



B. Circular plot,
defined shape and area



C. BioSoil plot,
defined shape and area

Level I: network design and NFI

Integration concept

- Simple integration of assessment methods
- Functional integration of networks
- Full integration (all-in-one)

Links with

FutMon C1-HarmonLS-40(IT); C1-NFI-8(DK); C1-NFI-25(SE)

Risk

Loss of data series

Review Article - doi: 10.3832/ifer0518-003

iForest - Biogeosciences and Forestry

Harmonizing forest inventories and forest condition monitoring - the rise or the fall of harmonized forest condition monitoring in Europe?

Ferretti M

Considerable attention was received by the proposed "harmonization" process between forest condition monitoring (FCM) and "traditional" national forest inventories (NFIs) networks. While some harmonization has been achieved and documented within the FCM at European level, it is not so for NFIs. Since the two systems may show remarkable differences also at country level, the extent to which a fully harmonized European-scale FCM-NFI system can be achieved is rather uncertain, if ever possible. In contrast, different harmonization perspectives may be considered at national level: (i) harmonization of assessment/measurement methods, (ii) functional integration of network while keeping them separate, and (iii) full integration of networks. Unfortunately while the cost-benefit balance of this harmonization processes was not clarified, actions were already undertaken that may lead to the disruption of the FCM data series initiated in the 1980s. The conclusion of the process may be ironic: will the current effort in "harmonizing" NFIs and FCM results into the disruption of the European-wide longest and most harmonized time series of forest condition data?

Keywords: Networks, Time series, Harmonization, Integration, Forest

Introduction

Considerable attention was received by the proposed "harmonization" between large-scale monitoring of forest condition and traditional national forest inventories currently being developed by the Life+ project FutMon (<http://www.futmon.org>). The issue was discussed at an international meeting held in Firenze, Italy, on March 20, 2009 (<http://www.sisef.it/futmon/20.htm>). The reason is clear: while the subject is of general importance (e.g., Köhl et al. 2000, Olsen et al. 1999), it is particularly so for a project like FutMon, which aims at the Further Development and Implementation of an EU-level Forest Monitoring System.

The large-scale monitoring of forest condition (hereafter referred to as FCM) started in Europe in the 1980s under the auspices of UN/ECE Convention on Long Range Trans-

boundary Air Pollution (with its ICP Forests) and of the European Union Regulation 3528/86 (Moffat et al. 2008). At that time, the alleged decline of forests in Europe was seen as a transboundary problem and a co-ordinated approach was advocated to obtain harmonized data and information (e.g., Innes 1993, Anonymous 1988, and subsequent reports of the UN/ECE and EU). For this reason, FCM was characterized since its early stages by an international perspective, promoted at both EU and UN/ECE level. Also because some conspicuous financial support (FCM in member states was sponsored by the EU at 50% over the period 1986-2005), this has resulted into an unprecedented effort to harmonize forest monitoring methods across Europe: defined sampling frequency (annual), density (nominal density: 1 plot every 256 km²) and attributes (defoliation, discoloration, damage causes) were suggested in order to obtain comparable and representative statistics at pan-European level; and as early as 1987 a first common Manual was agreed upon by the countries participating to the UN/ECE ICP Forests (Anonymous 1994). Since 1987 a series of co-ordinated annual surveys initiated and a time series of 10-20 yrs is now available for tree condition over much of Europe (Lorenz et al. 2009). Alongside, a series of meetings, workshops and cross-calibration courses were undertaken at national and international level to promote the calibration and comparison of

methods (Ferretti et al. 2009). Yet, some questions remain unsolved (Cozzi et al. 2002, Percy & Ferretti 2004):

- sampling design in terms of sampling scheme, density and plot design (e.g., fixed area vs. fixed number of trees) are different among countries;
- revisions of the FCM network to account for changes in forest coverage are not harmonized across Europe;
- tree condition assessment criteria (reference standard, assessable crown, defoliation vs. crown transparency) are not harmonized and - in some Countries - have changed over time.

Although the above limitations may be so important to hamper the value of the data (e.g., spatial comparison: Innes et al. 1993, Ferretti 1997, Ferretti 2004), a continuous, not yet fully exploited, time series of data about thousands of trees and plots across Europe exists (see Lorenz et al. 2009, and references therein). While other long-term, large-scale forest monitoring programmes exist (e.g., Forest Health Monitoring in the US started in the 1990s), such a data series is perhaps the largest in geographical coverage, the longest in time and the most documented one available in Europe and - at this level spatial and time coverage - perhaps in the world. In addition, there are information and data (at international and often at national level) to document FCM data consistency across time and space (e.g., Cozzi et al. 2002, and references therein, Mues et al. 2005, Ferretti et al. 2009).

Unlike FCM, National Forest Inventories (NFIs) were traditionally designed to provide country-based estimates of different forest areas and timber, non-timber attributes. As such and because of historical, commercial, and environmental justification (Mc Roberts et al. 2009), sampling designs, sampling frequency, definitions, methods and attributes were largely different across Europe (e.g., Köhl et al. 2000). Despite the recent work carried out under the COST Action E43 (<http://www.metla.fi/eu/cost/e43/>), "prospects for standardizing inventories are minimal" (Mc Roberts et al. 2009), while "amoderate level of European-wide harmonization" was reported as possible (Winter et al. 2008), depending on the objectives.

In general terms, NFI and FCM have similar features: they are typical sample surveys and their objective - loosely speaking - is to obtain reliable estimates of population parameter for the attribute(s) of concern, and to estimate time changes. Thus, harmonized FCM and NFI networks, or may be a single network of field plots supporting both NFI and FCM information needs, would offer considerable logical, logistical, technical, financial and information advantages, raising

✉ TerraData environmetrics, v. P. A. Mattioli, I-53100 Siena (Italy)

@ Marco Ferretti (ferretti@terradata.it)

Received: Jul 23, 2009 - Accepted: Sep 26, 2009

Citation: Ferretti M, 2010. Harmonizing forest inventories and forest condition monitoring - the rise or the fall of harmonized forest condition monitoring in Europe? *iForest* 3: 1-4 [online: 2010-01-22] URL: <http://www.sisef.it/iferest/show.php?id=518>

© SISef <http://www.sisef.it/iferest/>

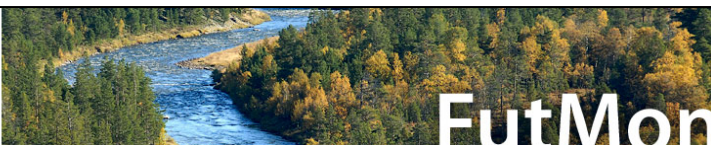
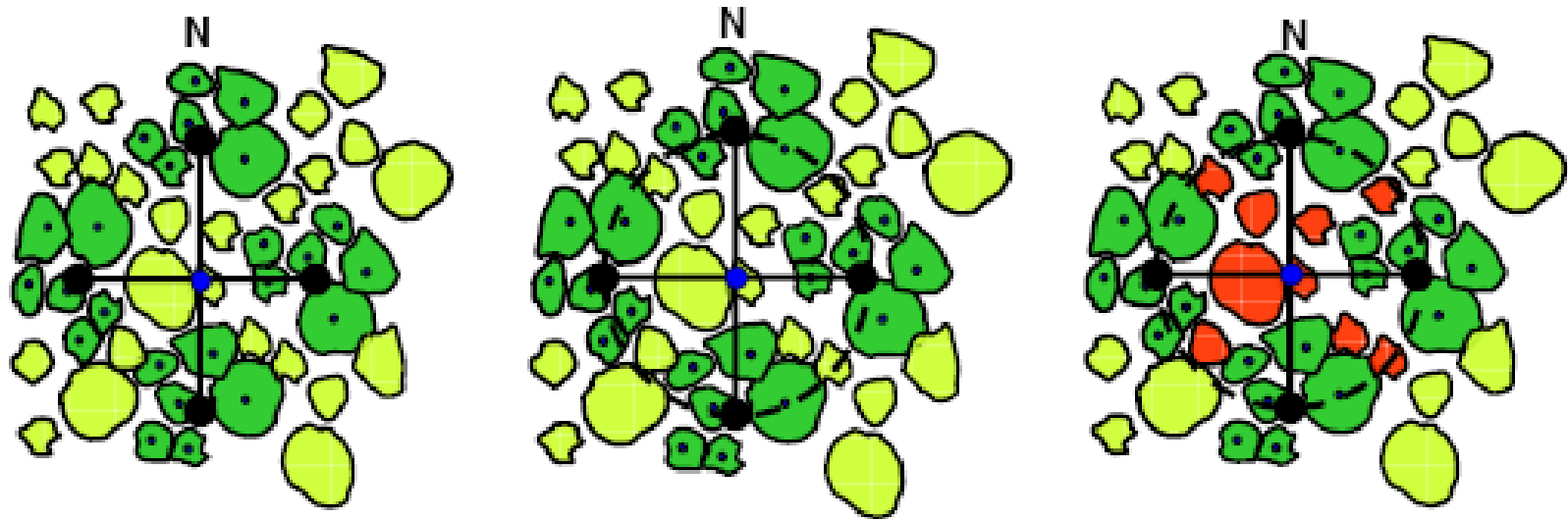
1

iForest (2010) 3: 1-4



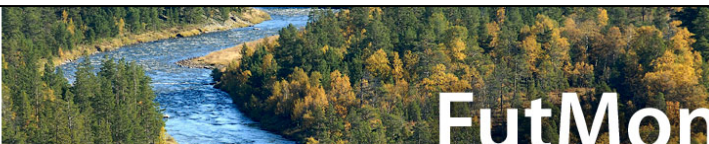
Associated Beneficiary:
Ministero delle Politiche Agricole Alimentari e Forestali
Corpo Forestale dello Stato, Italy

Level I – from cross-cluster sample to plot

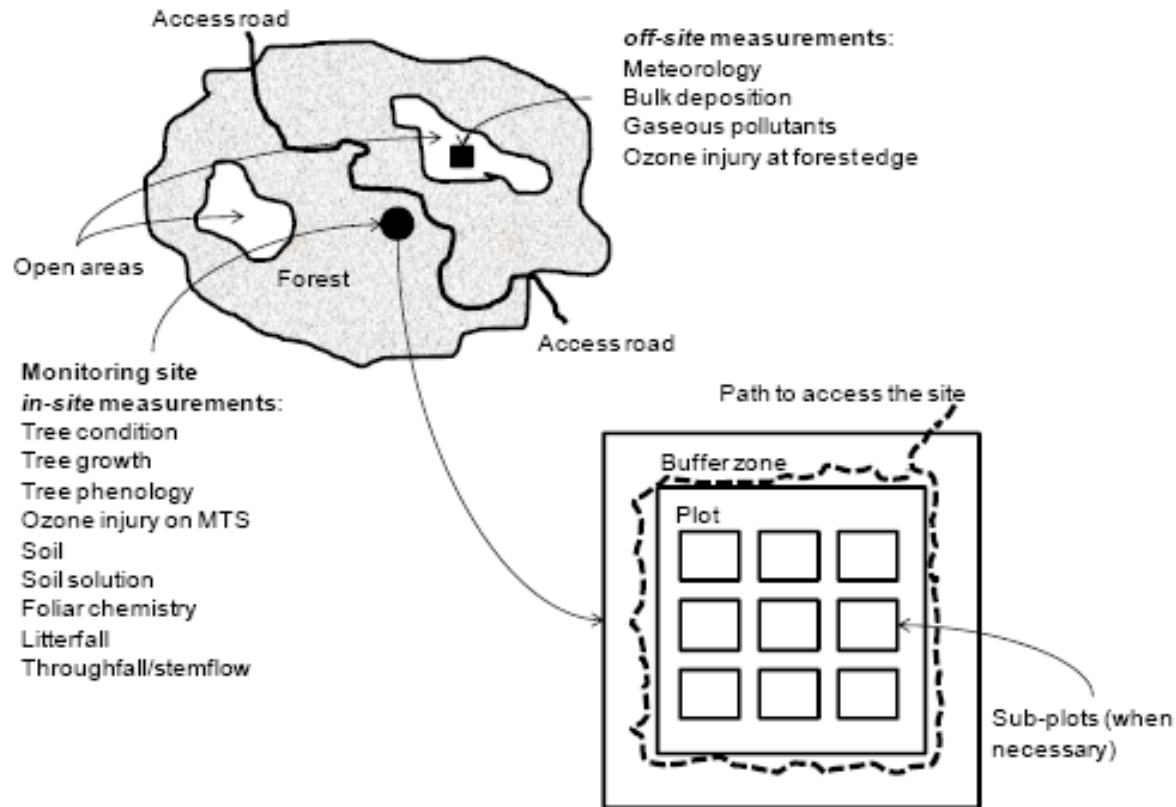


Level II - design

Subject	Areas of concern	Manual
Level II	Plot set-up	Level II site, plot, buffer zone
	Plots, dimension and shape	plot/sub-plots of known dimension and shape
	Minimum density	10% of Level I
	Plot selection	No change
	Location of measurements	in-site and off-site measurements
	Location of measurements	emphasis on the design at the plot level
	Responsability	National level



Level II plot design



Manual citations

ICP Forests reports and publications are cited as follows:

Author(s), year: title. editor (publisher) [e.g. UNECE ICP Forests], (title of omnibus volume [e.g. Executive report...]), place, pages or n of pages. In journals the respective rules have to be obeyed.

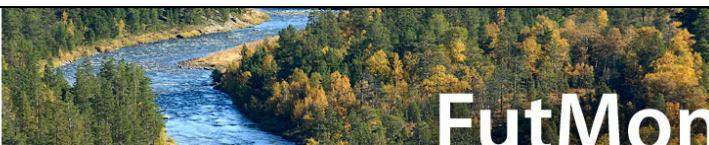
The Recommended Form of Citation should be included in all ICP Forests publications on the back of the cover page or on a colophon page.

The ICP Forests Manual as a whole must be cited as follows:

ICP Forests, 2010: Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of the effects of air pollution on forests. UNECE ICP Forests Programme Co-ordinating Centre, Hamburg [<http://www.icp-forests.org/Manual.htm>]

Individual Parts of the ICP Forests Manual must be cited as follows:

Relevant Authors, 2010. Title of relevant Manual Part. Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of the effects of air pollution on forests. In: ICP Forests, 2010, UNECE ICP Forests Programme Co-ordinating Centre, Hamburg, number of pages pp [<http://www.icp-forests.org/Manual.htm>].



Annex III: Intellectual Property Policy Document for the UNECE ICP Forests PCC Collaborative Database

(Karin Hansen, Richard Fischer, Bruno De Vos, Giorgio Matteucci, Päivi Merilä, Marcus Schaub, Walter Seidling, Peter Waldner)

