Miyawaki Method and Science

Is the Miyawaki Method based on strong scientific grounds? Are the commonly reported figures credible? For example when saying that Miyawaki urban forests grow 10x faster, 30x denser, with 20x more biodiversity?

URBAN FORESTS
DO IT WITH TREES !

http://urban-forests.com

Contact URBAN FORESTS
nicolasdebrabandere@gmail.com

AKIRA MIYAWAKI, THE SCIENTIST

Akira Miyawaki, who developed the method of the same name, is a renowned Japanese botanist. He carried out numerous field researches. First in Germany, where he worked with Reinold Tuexen on the concept of potential natural vegetation at the Federal Institute for Vegetation Mapping. The work forms a firm ground of knowledge that is still relevant today for the whole of Europe.

He then carried out the same work in Japan, where he produced for the entire country maps of existing vegetation as well as maps of potential natural vegetation, vegetation that he found at relict sites where native forests are still present. His maps are still used for scientific research. They serve as a model for reconstructing degraded natural habitats and the native plant environment. His fieldworks were conducted over a period of 10 years, and compiled in a 10-volume publication. His work is appreciated for its contribution to phytosociological research (community of plants living together), by allowing comparison of the architecture and characteristics of the vegetation of different areas of the world.

Much of his scientific work, and related researches, are published in Japanese, and not translated in English. This has not prevented him from achieving a remarkable scientific career, with his reputation crossing borders over many years.

CREATING NATIVE FORESTS FOR ENVIRONMENTAL PROTECTION

The originality of Miyawaki's work is that he described the distance between current forest vegetation and potential natural vegetation. Realizing it, he focused his attention on the importance of native forests and the functions of species diversity and complementarity.

His first field trials showed that plantations, whose composition and structure were as close as possible to what they would be in a native forest in the absence of human activity, grew rapidly and, above all, that they showed very good ecological resilience. Native forests are much more resistant to disturbances, to changes in the environment, to disasters. They also regenerate soils more quickly. He proposed a plan to restore native forests for environmental protection. These forests, even on a small scale, can protect life, infrastructure, and people.

His proposal took a long time to find a favorable echo, but it finally hit the mark, first with industries, which could thus restore degraded environments, then as a means of gaining protection against tsunamis, cyclones, for the fixing of embankments, slopes, and even around a new generation nuclear power plant!

Miyawaki actions have been widely supported by insurance companies, industrialists, communities, developers, and the State.

THE MIYAWAKI METHOD

Classical succession theory, developed by Clements (1916), indicates that it takes 150 to 200 years for native forest with a multi-strate community to restore itself on bare soil in Japan or Europe, and 300 to 500 years or more in tropical Southeast Asia.

Miyawaki postulates that the way of life of modern societies will probably no longer allow, in most cases, the necessary time needed for the regeneration of native forests. He therefore seeks to accelerate the process of ecological healing, by imitating as much as possible the normal composition of the primary forest according to the context. He estimates that he can obtain a restored forest in temperate zone, whose facies and structure (if not the genetic diversity, humus, dead wood, or sufficient amount of senescent stage) strongly resemble the native forest, in 20 to 30 years, that is to say **10x faster**.

In French

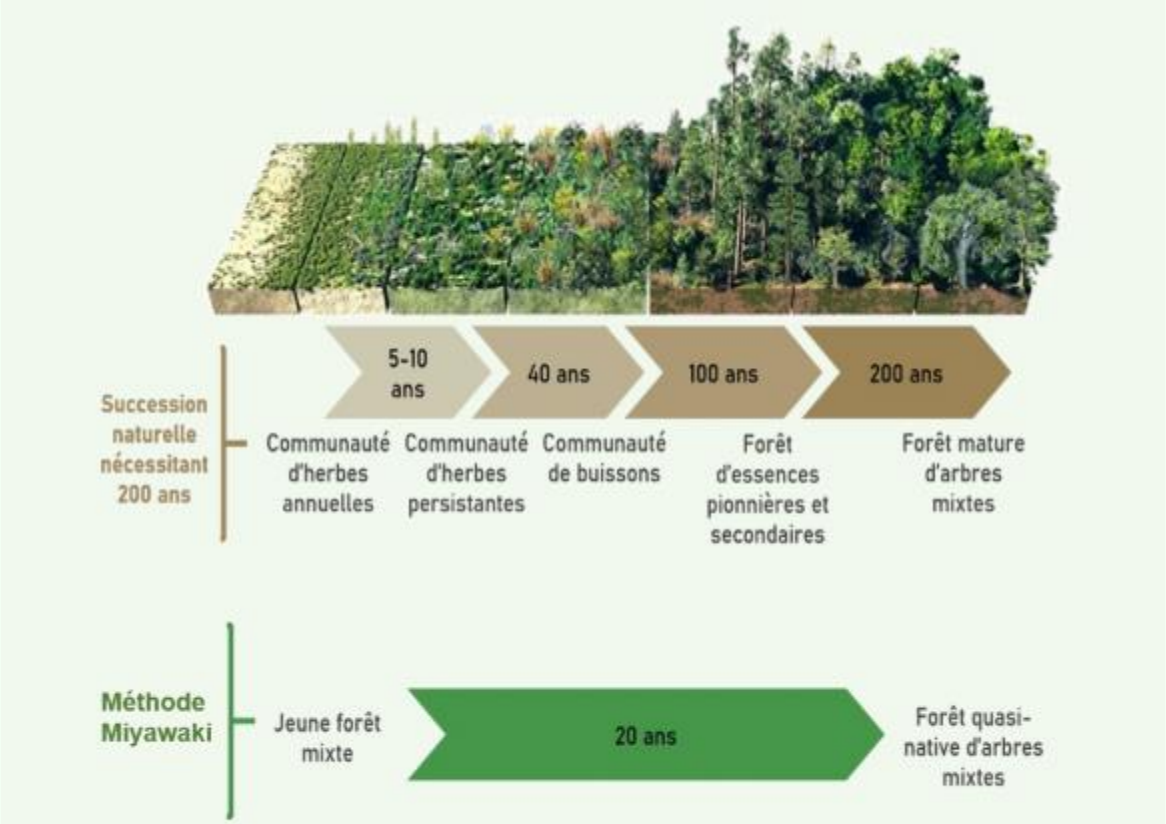

Figure 2 – Comparaison entre la théorie classique de succession et celle induite par la méthode Miyawaki [Adapté de] (Miyawaki, 2004)

The Miyawaki method was presented as exemplary in a preparatory report for the 1992 Earth Summit, and in the Biodiversity Congress 1994 at the Unesco "Biodiversity" symposium in Paris.

The method was also presented in 1991 at the University of Bonn Colloquium, "Restoration of Tropical Forest Ecosystems", and then at the congresses of the International Association for Ecology, the International Society for Vegetation Science,

and the International Botanical Congress, including new aspects linking growth, natural habitat and estimated carbon fixation.

Curiously, despite more than 1000 successful and sometimes spectacular realizations, the western world of forestry or landscaping has rarely attempted to apply or even test the "Miyawaki method". Fortunately, this is changing, although there is still a persistent denial on the part of some academics, researchers, foresters or ecologists.

The most cited criticism of the Miyawaki method is the high cost of the first phase, including soil preparation and the quantity of trees planted. This cost may be justified when considering exceptional degraded sites where conventional methods fail, or in case of difficult urban or industrial sites that require restoration. The method is also beneficial in the protection against environmental risks, pollution, infrastructure, storms, tsunamis.

The Miyawaki also gains interest to intervene on small areas in urban or peri-urban contexts, when ecological restoration is at stake, when results are needed quickly, for reconnection to nature, for aesthetic or landscape reasons, to involve the public, for biodiversity or simply by choice.

NUMBERS AND FIGURES OF THE MIYAWAKI METHOD

Miyawaki also showed, along with other researchers, that the leaf area of a multi-layered forest formed with potential natural vegetation is about 30 times greater than that of a single-layer lawn, which requires periodic maintenance.

With this figure in mind, it is reasonable to consider that a Miyawaki forest is **30x more dense** than a lawn or a meadow, a classical garden or tree plantation. This is important considering that the density, coupled with the complex three-dimensional structure of the forest, create a wide variety of ecological niches (e.g. different plant species attracting different fauna, canopy trees, understory shrubs, herbaceous plants, mosses, lichens, sun, shade, leaves, bark, twigs, soil, litter, roots, forest interior, edges). This complexity offer tremendous potential for a wide diversity of living organisms to move into the habitat thus created. The presence of organisms can be transitory, temporary, permanent, seasonal, or cyclical.

Scientific papers published in English, or other western languages, about Miyawaki forests, do not show comparison in terms of biodiversity between Miyawaki forests and urban or natural forests. It is possible that results are published in Japanese.

The most relevant study so far (Alterra - Animal ecology et al., 2018) to quantify biodiversity in a Miyawaki forest was made in the Netherlands in 1997. This study was conducted over a full year to compare biodiversity in two Miyawaki forests with that of the surrounding woods (control forests). The results on species diversity and number of individuals are clear: the Miyawaki forests, although very recent and small, count much **more biodiversity**, from 2 to 162 times more, on average **18 times more**.

The Miyawaki method is thus grounded on solid scientific documentation and reporting, with numerous experiments carried out in a multitude of contexts. The results are very positive and their practical and societal implications are very instructive. We invite the scientific community to continue the research on Miyawaki forests, on its biology and functioning, as well as on the societal, behavioral, environmental, economic, health and well-being impacts.

For those we wish to go further into the subject, we invite you to read the report produced by Urban Forests in 2020: **The Miyawaki Method, Data and Concepts**, on the website www.urban-forests.com