

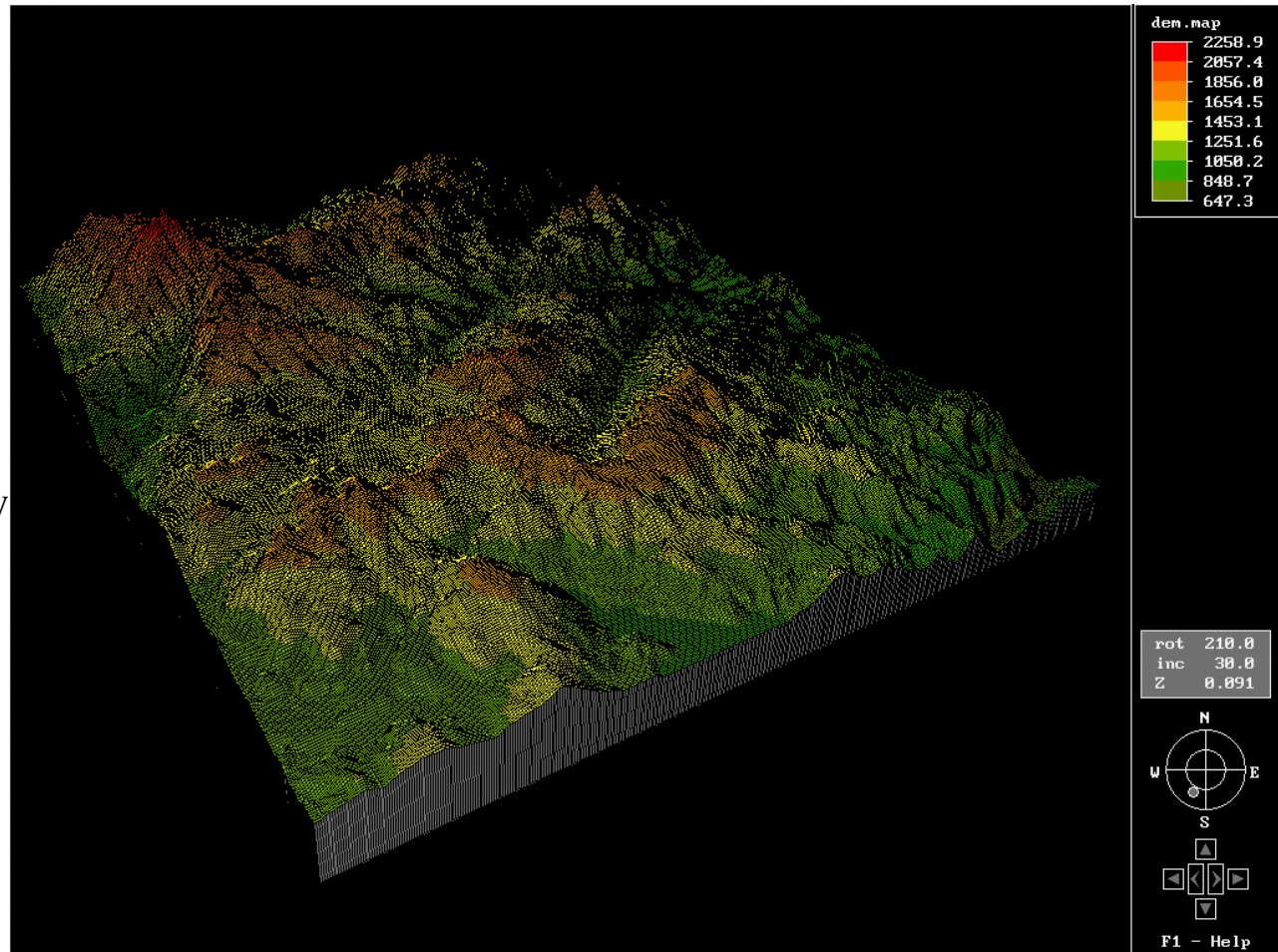
# Modelling landscape controls on the distribution of potential biodiversity

Biological diversity is at least in part controlled by current environmental conditions and their variability

Tropical mountainous environments (TMEs) are highly variable climatically, geomorphically and structurally with much of this variability controlled by altitude

Understanding, even in a crude way, the distribution of biodiversity in remote TMEs is essential for effective and focused conservation measures

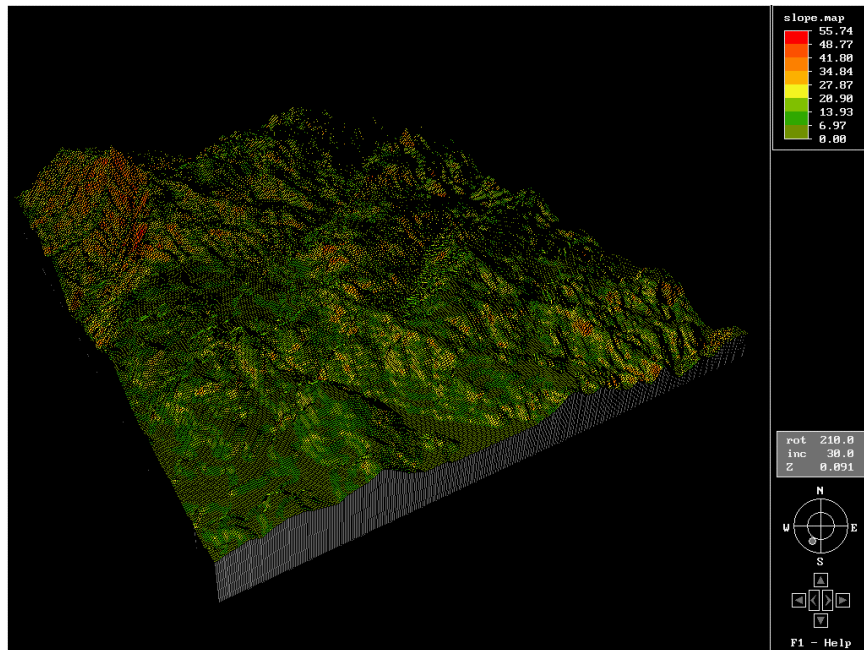
The Serrania de San Lucas forms a large isolated massif in the in the department of Bolívar, north western Colombia. Until recently, the Serrania de San Lucas represented the largest surviving block of tropical moist lowland and pre-montane forest in NW South America (Salaman, 1998). This area is very poorly known biologically and, on the basis of its structure and location, almost certainly represents an important area of endemism. The Serrania are now under very intensive developmental pressure for mineral extraction purposes.



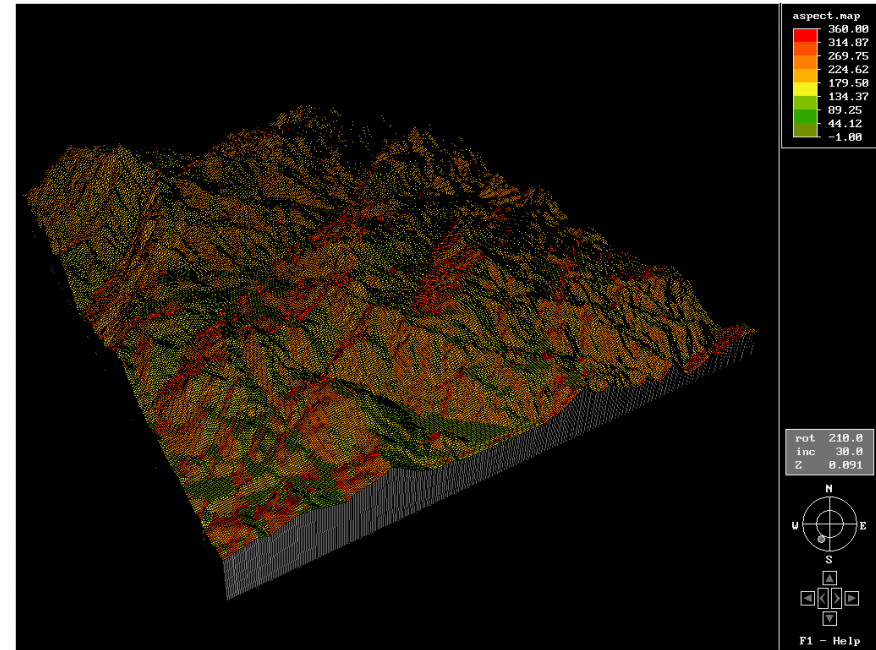
Topography in TMEs is an important control on local surface conditions through for example slope angle.[a]

Topography can also control climatic inputs through altitude and aspect [b], here aspect controls the annual total radiation receipt.[c]

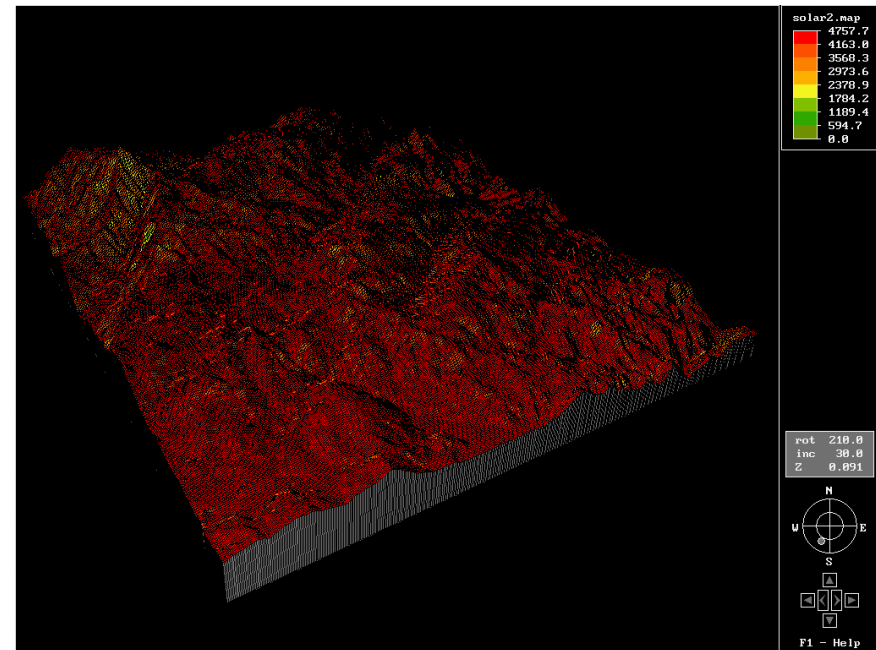
[a]

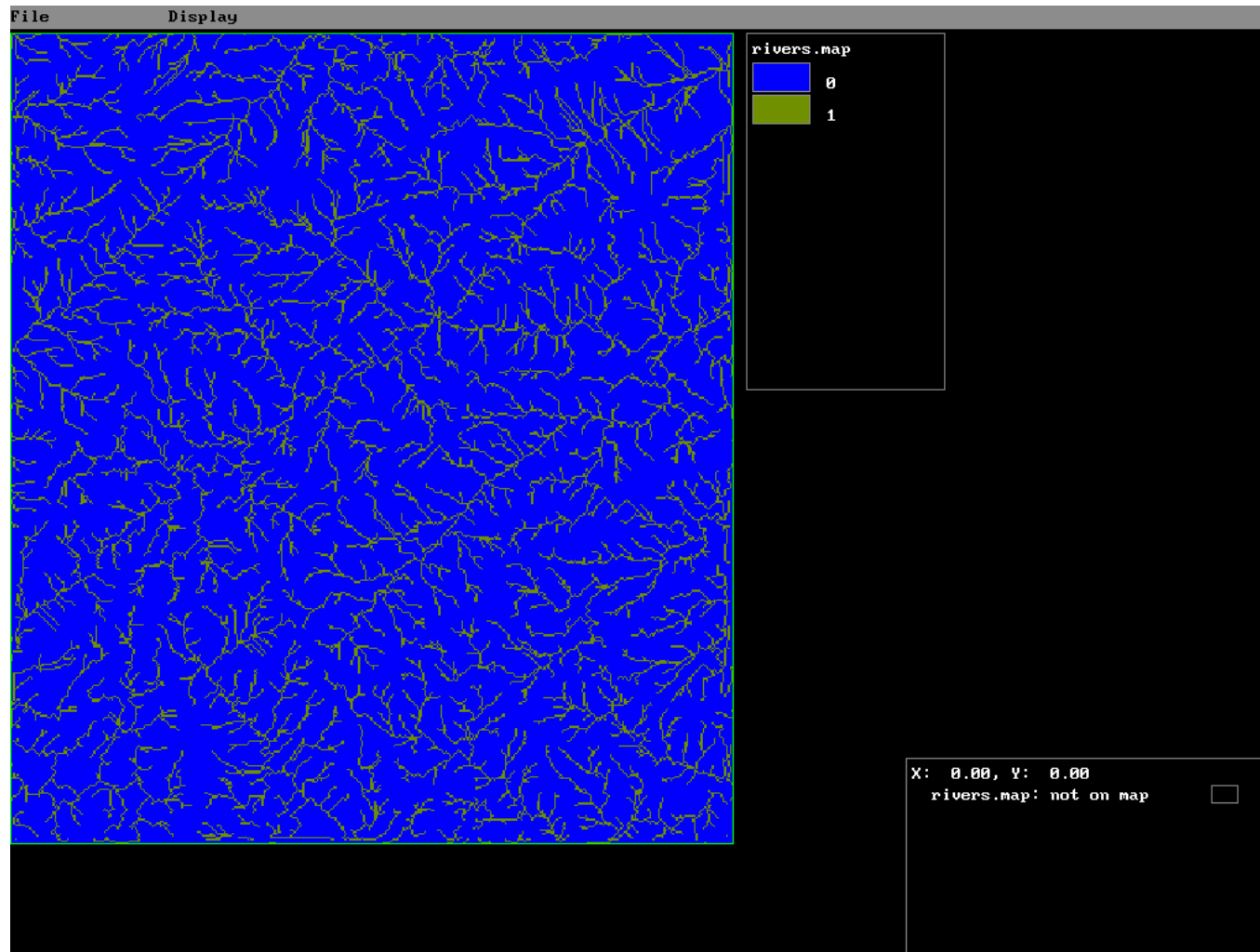


[b]



[c]





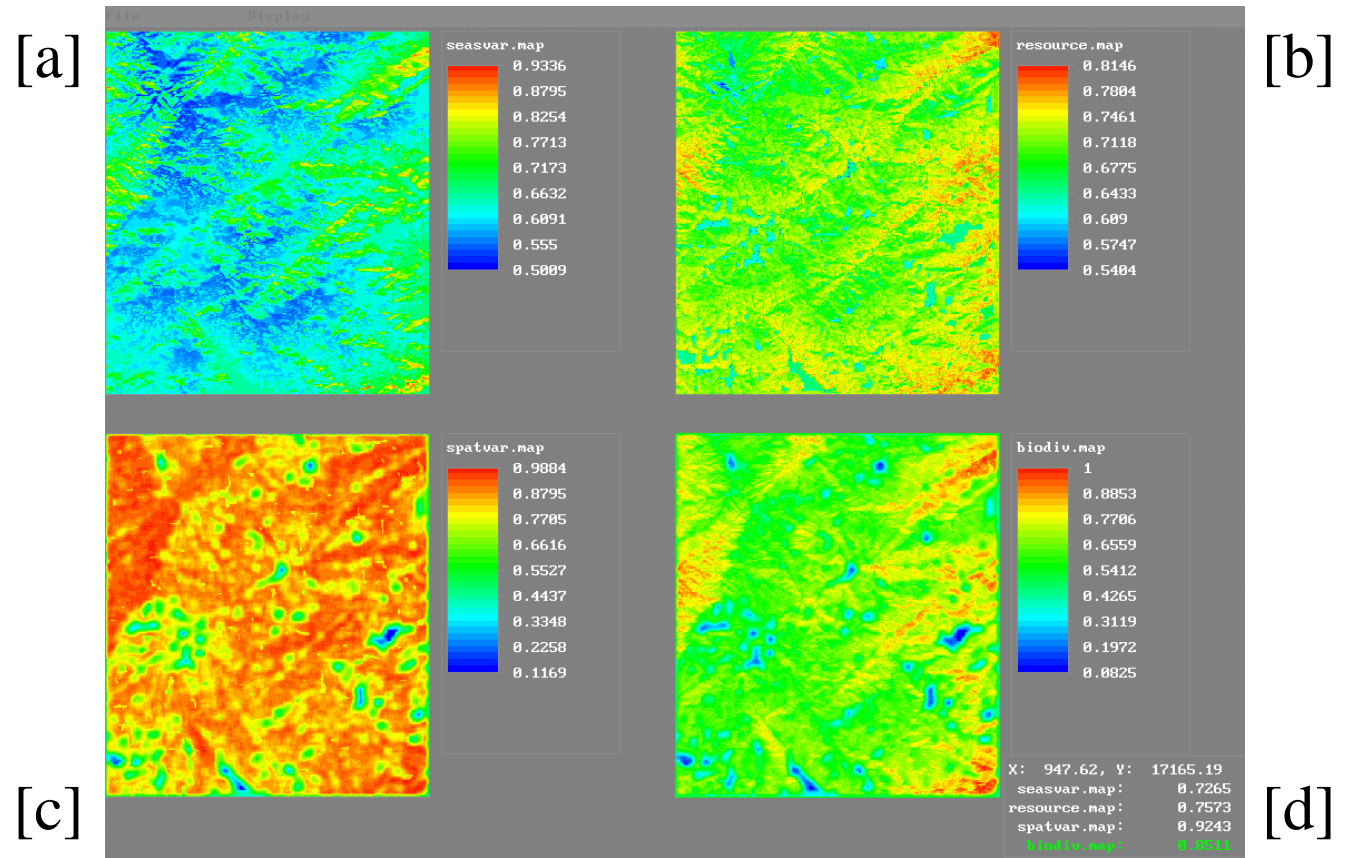
A variable topography leads to spatially variable environmental conditions such as is caused by river networks and this can isolate populations

A simple model for the potential distribution of species diversity on the basis of digital elevation model (DEM) derived landscape properties is proposed. The model calculates a relative index

of species diversity. This potential biodiversity index (PBI) increases with (a) the availability of resources, (b) the seasonal variability in these resources, (c) the spatial complexity of these resources and of landscape features and,

(d) the ecological complexity of the habitat.

The model is implemented in a geographical



The following factors are considered to promote higher potential biodiversity :

- (a) high seasonal variability in climatic factors (temperature, rainfall, radiation)
- (b) high levels of resources (temperature, rainfall, radiation, water balance)
- (c) high levels of spatial variability in landscape properties and resources (temperature, rainfall, radiation, topmodel wetness index, rivers)

These maps are overlaid to produce the biodiversity index

Other factors such as treefall and degree of isolation may also be taken into account

The *potential* biodiversity index indicates higher levels of biodiversity at low altitudes than at high altitudes except where the landscape is very highly spatially variable such as the major valley in the west of the DEM draining south-west.

Areas of lowest potential diversity are the flat lowland plains scattered throughout.

