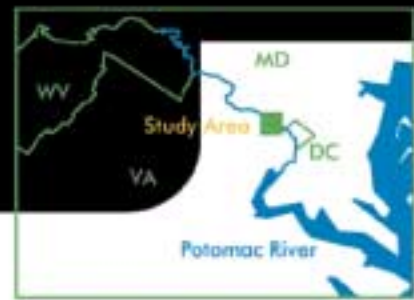


Appalachians



Geologic Maps Guide the Delineation of Ecosystems

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Defining the Problem

Responsible land management requires a complete and accurate understanding of the location and character of ecosystems, including physical environments, **habitat**, and both native and exotic biota. In the Potomac River gorge area (Fig. 1), man, animals, and water have introduced exotic and alien plants, as well as many native plant communities along the alluvial valleys, flood plains, and terraces. More than 15 **globally rare species** and more than 400 individual occurrences of 200 species rare to Virginia and Maryland are found within 30 different vegetation communities.

The Geologic Map

A geologic map of part of the Potomac River gorge area (Fig. 2) reveals that the bedrock at Great Falls is a complex assemblage of metamorphic and igneous rocks (€Zmg, €Zmm, €Zms, and Ob). These strong, erosion-resistant **rocks** are an important **control** on the topography. Downstream, the sedimentary and metamorphic bedrock is generally less resistant to erosion. Here, erosion deposited young gravels along river channels, and terraces were incised into bedrock. The side slopes of the uplands along the river consist of unconsolidated rock debris (colluvium). The flat terraces are subject to periodic floods that continue erosion but also locally deposit silt. Terraces that are elevated above the river have a veneer of alluvial silt, whereas the terraces along the river are bedrock with only local accumulations of alluvium. These bedrock terraces may contain pinnacles, water-filled potholes, and/or cliffs along their margins.

Applying the Geologic Map

Bedrock units on the geologic map have been reclassified according to their rock types (lithology) and general chemistry. The resulting map units are spatially associated with either basic or acidic soil. Surficial deposits were also reclassified on the basis of lithology of clasts and matrix, as well as topographic setting. The new bedrock and surficial deposit units were then combined with a digital elevation model to create the Geo-ecological Landscape Unit Map (Fig. 3). Distribution of upland forest communities is controlled by the type of underlying bedrock, colluvium, or gravel deposits. The detailed maps showing these units are excellent guides for locating the locally unique habitats of the study area.

Conclusion

Geology is a major influence controlling habitat development in the Potomac River gorge area where rare plants, critical habitats, and vegetation communities are closely associated with bedrock and surficial units. Individual communities are established on discrete geologic features within the 9700-acre area of the Potomac River gorge. Thus, geologic maps are a valuable resource for improving ecosystem delineation and analysis.



Fig. 1. Cliffs and terraces along the Potomac River gorge provide habitats for rare plants.

geologic map

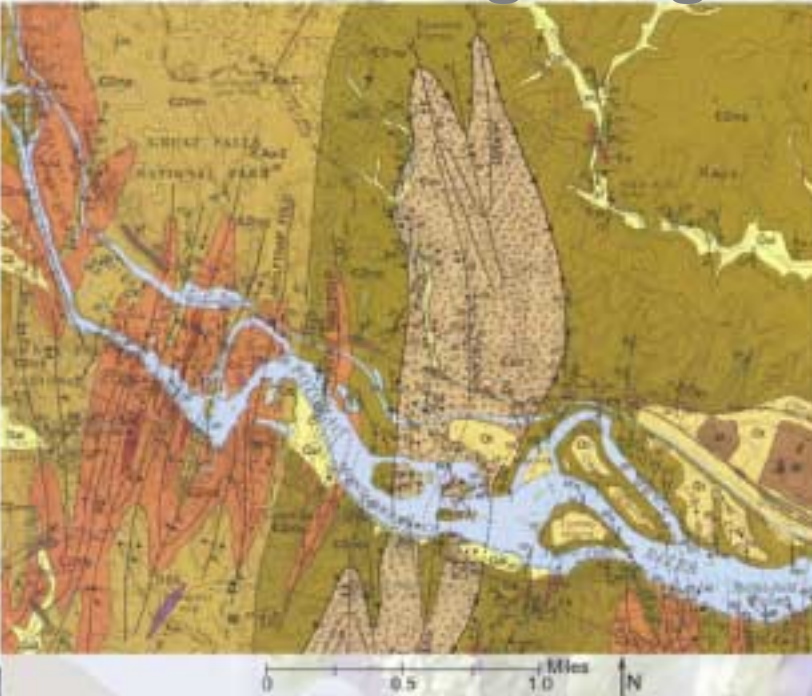


Fig. 2. Data from this geologic map of the Potomac River gorge area, Virginia and Maryland was used to produce the Geo-ecological Landscape Unit Map (Fig. 3).



geo-ecological landscape unit map

Fig. 3. The Geo-ecological Landscape Unit Map of the Potomac River gorge area is a valuable tool for land-management planning. Based on geologic map data, the geo-ecological map delineates ecosystem characteristics. The map covers an area containing about 30 vegetation communities.

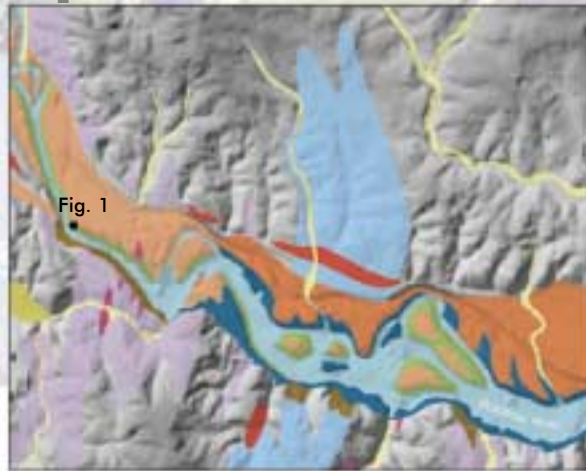
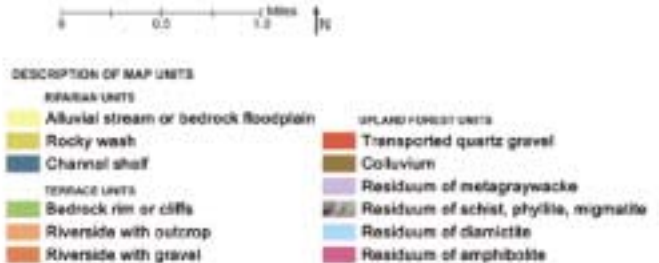


Fig. 1



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