

The Impacts and Evaluations of Catchment Scales on Forest Hydrology

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Abstract: The influence of forest vegetation cover to terrestrial hydrological processes varies with the watershed size. But the accurate recognition and quantitative assessment to the scale effect are very difficult. In the paper the cause of scale effect of watershed to hydrological features is discussed, its impact mechanism and variation features are analyzed as well. The watershed size and forest distribution will change energy balance, potential evaporation, runoff components, flow's velocity and channel storage capacity of a basin. These factors vary with forest area and watershed size. With the increasing of watershed size, the forest's impact to hydrological processes gets lower and river channel's effect becomes higher. The watershed scale will turn runways of runoff as well. The ratios of groundwater will increase and surface runoff decrease with the size increasing of watershed. This change in runoff composition may influence the flood hydrographs and low-flow discharges. The optimal forest coverage and suggested ratio have been suggested based on benefit maximum rule of ecological engineering. These results will help to identify the different effects between forest characteristics and watershed's size, and can be applied to improve the estimation of forest-hydrology effects.

Key words: Forest-hydrology; watershed scale; influence mechanism; effect evaluation

封面照片: 雅拉雪山(北坡)

拍摄地点: 四川甘孜藏族自治州丹巴县东谷河河源附近, 海拔 3 500 m 左右。

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雅拉雪山藏语全称为“夏学雅拉嘎波”(意为东方白牦牛山),系中国藏区四大神山之一。位于四川甘孜州康定、炉霍和丹巴三县的交界处,海拔 5 884 m,与它西北方向的墨尔多神山遥遥相对。山顶终年积雪,是康巴地区一座著名的神山。雅拉雪山地跨道孚、康定、丹巴三县,其西北面与塔公草原相连,形成雪山与草原交相辉映的壮美景观。雅拉雪山北坡终年积雪覆盖,秋季从丹巴县牦牛沟南眺雅拉雪峰洁白的雪山与五彩斑斓的灌木、乔木树叶一起组成一幅巨幅的风景油画。牦牛河谷海拔从 4 000 m 直下到 1 780 m,发源于雪山,植物资源丰富,原始森林遮天蔽日,遍布奇峰异石,众多的海子星星点点地散落于河谷中。牦牛河谷最著名的是它的温泉,东谷热水塘是其中最著名的。据《七世达赖喇嘛噶桑嘉措的政教业绩》记载:第七世达赖喇嘛于 1930 年离开理塘,移居泰宁(今乾宁)惠远寺。住在惠远寺的近五年时间里,每年都要到丹巴的热水塘沐浴。信徒都把此地视为吉祥之地,每到农闲时节,丹巴和其他地方的乡民,便要带上丰盛的食物,在此小住几日,每天必到温泉泡上一两个时辰。

(蓝永超)