2.2 Problem Analysis

湖泊水质和赤潮发生情况是评价它的重要标准。而影响湖泊水质的主要指标是不同土地类型的N、P负荷。对于水质的预测，我们可以建立土地类型与N、P负荷之间联系的模型来解决问题。

In order to build a model for forecasting the effects of different land management scenarios on lakes, we find that the reason for which land management can have great impacts on lakes is that different land use contributes different [nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) and [phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F" \t "_blank) concentrations which are the criterion of water quality to Chao Hu, apparently, we can formulate model based on the relationships between land management and [nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) ,[phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) load to forecast the water quality. Besides land management, we cannot ignore the effects of temperature, hydrology and meteorology on the output of [nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) and [phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F).

Furthermore, [nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) and [phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) loads are closely related to potentially-toxic algal blooms. The number of algal blooms can be represented by [chlorophyll](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E5%8F%B6%E7%BB%BF%E7%B4%A0A" \t "_blank), so the [neural](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E7%A5%9E%E7%BB%8F%E7%BD%91%E7%BB%9C) [network](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E7%A5%9E%E7%BB%8F%E7%BD%91%E7%BB%9C" \t "_blank) can be built by [chlorophyll](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E5%8F%B6%E7%BB%BF%E7%B4%A0A) as output and factors influencing potentially-toxic algal blooms reproduction as inputs to forecast the water quality indirectly.

Eventually, we could get data about [nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) and [phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E9%87%8F) concentrations with [chlorophyll](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E5%8F%B6%E7%BB%BF%E7%B4%A0A), then a six-level evaluation system can be established combined with factors affecting the above data by AHP [algorithm](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E7%AE%97%E6%B3%95).

查阅相关文献资料，我们了解到，水域内藻类的数量可以用叶绿素A来表征，而且当叶绿素A的含量高于0.01mg/L时，表明水域藻类数量达到了发生赤潮的条件。赤潮是一种复杂的生态异常现象，发生的原因也比较复杂，所以，我们建立神经网络模型，对可能影响赤潮发生的因素作为输出，叶绿素A含量作为输出，从而对水域赤潮的发生进行预测。

在论文中，根据题目要求，我们还需要建立湖泊的评价模型。我们建立了基于层次分析算法的评价模型。其中，最上层是湖泊综合评价。中间层是N、P总量和叶绿素A含量。土地管理方案、温度、PH值、含氧量构成最下层。然后，我们根据文献资料，建立一个包含六个级别的评价体系。最后，结合数据就可以对巢湖进行评价并判断级别。

3 General assumptions

1. 假设收集的数据准确可靠，能够较好的反映真实情况；

Assuming that data collected is accurate and reliable, and can reflect real conditions preferably.

1. 假设我们自己设定的几种不同的土地管理方案，各种类型土地的输出系数只与类型有关，与该类型面积大小及其他因素无关；

The different land use management scenarios were formulated in order to improve models’ applicability, moreover, nutrient export coefficients from land are only subject to land use types, not its area and so on.

假设改变不同类型土地的比例时，温度、降雨量等因素保持相同。

Temperature, rainfall runoff and other factors which affect [Nitrogen](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E5%90%AB%E9%87%8F" \t "_blank) and [Phosphorus](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E6%B0%AE%E7%A3%B7%E5%90%AB%E9%87%8F) concentrations in soil drained to Chao Lake should be at the same rate when we change the proportions of different land use.

假设污染物质量守恒

Under a certain scope, pollutants from [agricultural](http://cn.bing.com/dict/clientsearch?mkt=zh-CN&setLang=zh&form=BDVEHC&ClientVer=BDDTV3.5.0.4311&q=%E5%86%9C%E4%B8%9A%E5%8C%96%E8%82%A5" \t "_blank) fertilizer, septic tank, industrial plant and so on do not change with time and obey conservation law of mass.